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H. R. Worthington's Duplex Steam Pump.

There is no machine of more universal and diversified application and utility perhaps, than is employed in the different devices to raise water for the various mechanical and manufacturing operations, and for the numberless domestic uses of life. And there is no mechanical department that has more fully employed the scientific and inventive talent of the country possibly.

Ewbank in his excellent work on Hydraulics says, "the art of raising water has ever been closely connected with the progress of man in civilization." It is an art which called forth the ingenuity of man in the earliest stages of society—and indirectly, no doubt, gave birth to some of the simple machines or mechanical powers themselves.

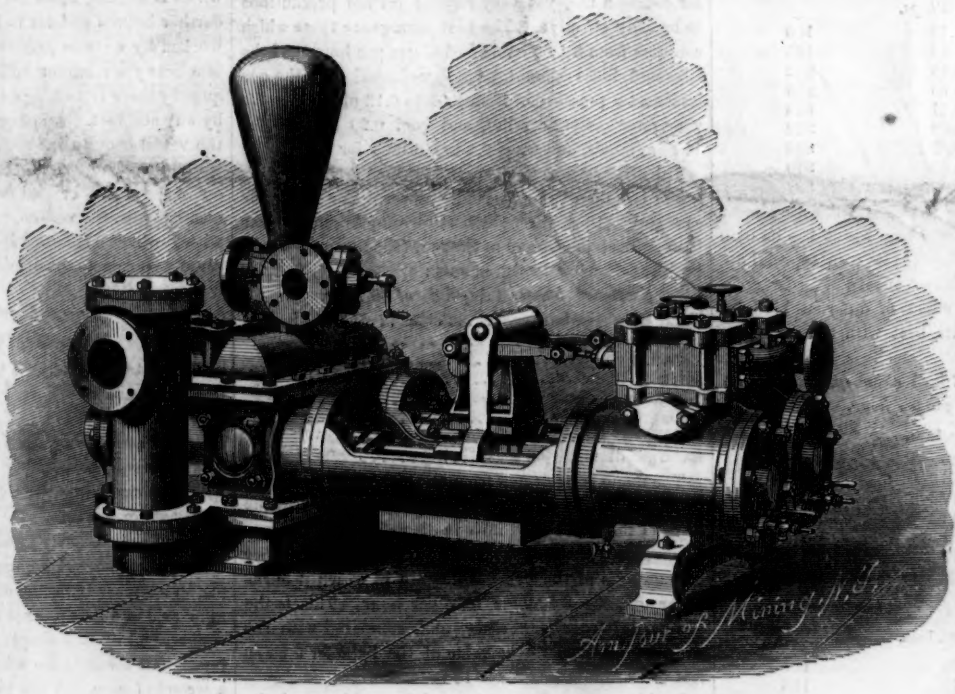
In this connection we present the accompanying illustration of Worthington's Duplex Steam Pump, which is well and favorably known to the public.

The valve motion is the prominent and important peculiarity of this pump, as being that to which it owes its exemption from noise or concussive action. Two steam pumps are placed side by side, and so combined as to act reciprocally upon the steam valves of each other. The one piston acts to give steam to the other, after which it finishes its own stroke, and waits for its valve to be acted upon before it can renew its motion. This pause allows all the water to seat quietly, and removes everything like harshness of motion. As one or the other of the steam valves must be always open, there can be no centre or dead point. The pump is therefore always ready to start when steam is admitted, and is managed by the simple opening and shutting of a valve.

An application of the principal to independent air pumps for marine engines is in successful operation on a number of steamers. It supersedes the ordinary air pump attached to the main engines, and where surface condensers are used is combined with circulating pumps. A modification of the arrangement has proved to be well adapted to air pressure pumps for oil wells. Attention of purchasers is also directed to the blowing engines made on the same principle for cupolas and blast furnaces. It is, however, in its application to Water Works Engines of the largest class that the peculiar features of the system are most favorably developed, attaining as it does an economy in fuel at least equal to any realized elsewhere.

In the arrangement of the Duplex Pump special care has been taken to have all the parts easily accessible for inspection or repairs. All the moving pieces being made to guage, can be readily renewed.

H. R. Worthington is the manufacturer of this pump, 61 Beekman street, New York.



H. R. WORTHINGTON'S DUPLEX STEAM PUMP.

Precipitation of Metals from their Saline Solution by Means of Magnesium.

M. Ronssin has just published a paper on the action of magnesium on metallic solutions, and on its application to toxicological researches, which shows that magnesium is particularly well adapted for the precipitation of other metals from solution of their salts. It is a general principle that one metal will precipitate from a saline solution any other which is less readily oxidable than itself; but some metals, by no means among the most oxidable known, had nevertheless, when M. Roussin began his researches on this subject, resisted all attempts to precipitate them by the contact of another metal with their saline solutions. With two exceptions, however, all the metals alluded to are precipitated in the metallic state by magnesium, the two exceptions being chronium and manganese, which appear to be precipitated as oxides. Among the metals which M. Roussin has precipitated in the metallic state, by means of magnesium, from slightly accidulated solutions of their salts, are gold, silver, platinum, bismuth, tin, mercury, copper, lead, cadmium, thallium, iron, zinc, cobalt and nickel. The precipitated metals, when washed from the saline liquid and then dried and compressed, possess a very remarkable degree of brilliancy. Iron, cobalt and nickel, so precipitated, are highly magnetic; zinc takes the form of a large spongy mass, which the least compression renders brilliant. Magnesium does not precipitate aluminum at all, and chromium and manganese, as already mentioned, it precipitates as oxides. It does not precipitate arsenic or antimony, though it decomposes their salts, the arsenic or antimony flying off in combination with hydrogen. M. Roussin shows that great advantages result from the substitution of magnesium for the metals ordinarily employed in toxicological researches for the detection of these and other metellic poisons; but into that part of his subject it would be beyond our province to follow him. His only further statement respecting magnesium calling for mention here, is one relating to its use as a voltaic element. "The foregoing qualities," he says, "encouraged the hope that a substitution of magnesium for zinc in ordinary piles would offer a great electro-motive force, and experiment confirmed this theoretical inference. A small plate of magnesium, of 1 grain in weight, placed beside a plate of copper in a small tube of glass of six centi-metres cube, filled with acidulated copper, produced in less than ten minutes an electro-magnetic appearance, and illuminated a Geisler's tube ten centimetres long. If magnesium should ever become cheap, this would decidedly be the best way of producing electricity."

In a note to his paper, M. Roussin states that he has observed that a sodium amalgam, shaken up with an acidulous solution of a salt of chromum or of a salt of manganese, changes to an amalgam of chromium or of manganese, as the case may be, and that an amalgam of either of these metals, obtained in the manner indicated, when distilled in a current of hydrogen, after having been first carefully washed in acidulated water, leaves the pure metal in the form of a pulverulent sponge.

The amalgam of manganese, he adds, is opalescent and crystalline; that of chromium more fluid, and less variable at ordinary temperatures. When the latter is heated in a small porcelain capsule in the air, as the mercury flies off in vapor it carries off mechanically with it particles of chromium, which take fire, producing a singular scintillation, which is best observed in a darkened room. At length the chromium remaining in the capsule suddenly becomes incandescent, and burns to oxide.—*Mechanics' Magazine.*

On the Combustion of Gas for Economic Purposes.

A Lecture delivered before the British Association of Gas Managers.

By Dr. Letheby.

(From the London Chemical News, No. 341.)

(Reprinted at Philadelphia in the Journal of the Franklin Institute.)

The practical conclusions from these inquiries are, that gas must be burnt with such a proportion of air as that, on the one hand, the particles of carbon shall be intensely heated, and shall remain as long as possible in an ignited state, and, on the other hand, they must not escape unburnt.

Relative luminosity of different burners, calculated for the same consumption.

Kind of Burner.	Pressure at Burner.	Relative value per foot of Gas.
Single jet	0.50	100
Fishtail	0.25	146
Bat's Wing	0.18	153
Argand	0.17	198
Bengal	0.13	214

Relative luminosity of jets of different sizes calculated for the same consumption.

Size of jet, Inch.	Pressure at Burner.	Relative value per foot of Gas.
0.040	0.87	100
0.056	0.35	110
0.083	0.12	136
0.100	0.04	150
	Fishtails.	
0.036	0.47	100
0.045	0.39	194
0.056	0.24	293
0.062	0.39	319
	Bat's Wings.	
0.008	1.19	100
0.012	0.49	184
0.016	0.24	232
0.010	0.16	293
0.024	0.11	313
0.028	0.09	322
0.032	0.07	316
0.036	0.04	310
0.040	0.03	307

The difficulties in arriving at these results are almost insuperable, for every illuminating agent has its own particular conditions, and requires its own especial appliances to bring out the fullest effects.

Take, for example, the effect of different kinds of burners, each burning at its best with the same gas (13-candle).

Argands of 15 holes and 7-inch chimney, consuming 5 cubic feet of gas per hour.

Size of Inner Hole.	Pressure, Inch.	Retative value Per foot of Gas.
0.70	0.66	100
0.57	0.46	108
0.48	0.17	117
0.44	0.17	150
0.43	0.17	116
0.42	0.17	110

Relative luminosity of the same jet (0.04 inch) at different pressures, calculated for equal consumptions.

Consumption per hour, Cubic Feet.	Pressure, Inch.	Relative value per foot Gas.
0.88	0.28	100
1.31	0 43	156
1.80	0.87	195
2.33	1.38	240
2.83	1.88	264
3.53	2.68	270
	Fishtails, (0.03 inch holes).	
2.00	0.17	100
3.00	0.34	109
4.00	0.50	111
5.00	0.74	110
6.00	1.00	95
	Bat's Wings, (0.015 inch slit).	
2.00	0.13	100
3.00	0 21	109
4.00	0.29	135
5.00	0.45	128
6.00	0.53	122
7.00	0.68	121
Sugg's Argand 15 holes, (0.45 internal diameter; hole, 0.05 inch).		
2.0	0.04	100
3.0	0.08	143
4.0	0.12	183
5.0	0 27	202
5.5	0.18	201
6.0	0.19	196

Again, the same kind of burner, but of different sizes, will give different values.

And again, the same burner with different pressures, and therefore, different rates of consumption will give different values, when calculated for the same quantity of gas.

And so also with cannel gas, although in many cases the variations are not so great as with common gas, yet they are sufficiently considerable to be serious. This is seen by the following table, which I have drawn up from the experiments of Mr. King, of Liverpool:

Relative illuminating power of cannel gas, when burnt from different burners, and in different quantities from the same burner.

Power in sperm candles (120) per foot of gas.

Kind of Burner.	1 ft. per hour.	2 ft. per hour.	3 ft. per hour.	4 ft. per hour.	5 ft. per hour.
Single jet	2.64	..	..	..	.
Lancas'e fishtail, No. 2	3.23	3.50	3.66	..	..
" " No. 4	3.59	3.85	4.11	4.0	..
London " No. 2	3.49	3.61	3.89	3.85	..
Bat's wing	3 09	3.76	4.05	4.11	4.16
16-hole Argand	0.26	1.74	2.43	3.54	3.68
Winfield 28-hole Arg'd	0.28	2.04	3.09	3.57	3.77

What, then, is to be done in the apparent confusion of all these facts, and can any useful generalization be made of them?

In the first place, we perceive that, of all kinds of burners, the single jet is the least effective.

Secondly, we notice that, although the bat's wing and fishtail burners are not subject to so great variations in power as others, and are, therefore, best suited for common use, yet they require certain precautions to be fully effective. The best burners are those which consume from 3 to 5 cubic feet of gas per hour, and the slits and holes should be so graduated that the gas issues at a pressure of from 0.08 to 0.12 of an inch for very poor gas (12-candle), and from 0.20 to 0.40 for 14-candle gas, and from 0.4 to 0,6 inch for cannel gas

Thirdly, we find that Argand burners are only fit for gas of less than 18 or 19-candle power. For very poor gas, (up to 13-candle,) the best form of Argand burner is the porcelain Argand of France, (the Bengal,) which has the following measurements:

Bengal burner (Argand) of 30 holes.

Total weight of burner	3.150 inches.
From gallery rest to top	1.220 "
External diameter	0-886 "
Internal diameter	0.354 "
Diameter of circle of holes	0.650 "
Diameter of holes	0.034 "
Height of glass	7.87 "
External diameter of glass	2.00 "

The flame is protected from currents of air by a cage or basket of porcelain below, which is pierced with 109 holes of the 0.118 of an inch in diameter. This burner requires a pressure of from 0.13 to 0.25 for the proper consumption of the gas, and the rate at which it burns never exceeds 3.5 cubic feet per hour. This is the standard burner for France, and, compared with the best English burners, the value of the light for 5 cubic feet of 13-candle gas is as 113 is to 100.

In this country the best form of Argand burner is the 15-hole steatite burner of Mr. Sugg. The measurement of it are as follows:

Sugg's steatite (Argand) of 15 holes.

Total height of burner	3.00 inches,
From gallery rest to top	1.00 "
External diameter	1.00 "
Internal	Variable according to quality of gas.
Diameter circle of holes	0.80 inches.
" of holes	0.06 "
Height of glass	7.00 "
External diameter of glass	2.00 "

The flame is protected by a perforated metal disk placed under the gallery, the perforations being 0.08 inch in diameter, and 8 in the inch linear.

The diameter of the inner hole or air-channel should vary according to the power of the gas, thus:

For 12-candle gas	0.44 inch
" 14 " "	0.48 "
" 16 " "	0.55 "
" 18 " "	0.60 "

All these Argands have the holes the 0.06 of an inch diameter, and the pressure is only 0.07 of an inch, instead of 0.17, as with the old Sugg of 0·04 diameter. Above 18 candles, the bat's wing is the best burner for educing the light, and it should be regulated from 4.5 feet to 4 feet, according to the richness of the gas. And now before I leave this part of the subject, I will show you some of the contrivances which have been proposed for increasing the illuminating power of a poor gas.

(To be continued.)

The "Hydraulic Propeller."

A trial has recently been made of a new principle of motion, as applied to vessels, called the "Hydraulic Propeller" (Ruthven's patent). The *Nautilus*, to which the power has been applied, was built expresaly to show that it can with less horse power than ordinary river boats, equal them in speed. The *Nautilus* at the trial started from Vauxhall Bridge pier at 11 o'clock in the morning, and ran up and down the river Thames in company with the *Citizen* and other river steamers, and held way with them steadily, gaining a little on some. She ran between Vauxhall and Westminster bridges with the wind and tide in 4′ 26″, and against in 8′ 22″, being at the rate of 13.5 and 7.2 miles per hour respectively, or at an average speed of 10.35 miles per hour—say 10¼. She then steamed down the river, and when off the Tunnel pier, with both strong wind and tide in her favor, going at full speed, was made to stop suddenly by reversing the valves. She stopped dead in less than ten seconds, and in about a quarter of her length. Her majesty's iron-clad gunboat *Waterwitch*, now being built, is to be fitted with the new propeller, which is nothing more nor less than water taken in under her bottom and set in motion by simple machinery worked by a steam ,engine. The water is discharged in a heavy stream on both sides of the vessel, consequently there is nothing outside the vessel to be injured by any accident. Another important novelty is that the vessel is quite independent of her rudder, and is worked under the complete control of the master, officer of the watch, or man on deck, without any communication with the engine. The *Nautilus* is also fitted with Ruthven's steering apparatus—an invention which gives a large amount of power to the rudder.—*Mechanics' Magazine.*

Ocean Telegraphy.

The contents of a lady's thimble would hardly be expected to constitute a very powerful instrument. They would scarcely have been thought capable of one of the most astonishing feats ever performed by science. The chairman, however, of the Atlantic Telegraph Company, informs us that this little instrument has actually achieved such a feat. By way of experiment, the engineer of the company joined the extremities of the two cables which now stretch across the Atlantic, thus forming an immense loop line of 3,700 miles. He then put some acid in a lady's silver thimble, with bits of zinc and copper, and by this simple agency he succeeded in passing signals through the whole length in little more than a second of time. A few years ago how incredible such a statement would have sounded! It seems, indeed, that the simplicity of the fact has taken even electricians by surprise. When a cable was first laid across the whole breadth of the Atlantic, it was anticipated that an unusually high power would be requisite to drive the current in sufficient force through such a length. In the first instance, therefore, they used a battery with 50 cells, and afterwards employed 500 cells. But this extraordinary power only injured the cable, and the company are now working between Valentia and Heart's Content with a battery of only 20 cells. It is, in fact, remarkable how greatly the success of the present year has dissipated the supposed difficulties of distant or deep-sea telegraphy.—*London Times.*

Electro-Magnetic vs. Cornish Engine.—One grain of zinc was found to raise only 8 lbs. 1 foot high by means of an electro magnetic engine; one grain of coal in the furnace of a Cornish engine will raise 143 lbs. through the same distance.

The Process of Roasting Ores.

Translated from the German of F. Plattner, for the MINING & PETROLEUM STANDARD AND AM. GAS-LIGHT JOURNAL, by

J. H. TIEMANN.

[Entered according to an Act of Congress, in the year 1866, by Bryant, Callender & Co., in the Clerks Office of the District Court of the United States, for the Southern District of New-York.]

NUMBER IX.

b. Experiments on the formation of sulphuric acid and sulphates, by the oxides yielding oxygen to the sulphurous acid, when there is an insufficiency of atmospheric air.

In how far the conjecture is correct, that the sulphurous acid formed in the roasting, may take up oxygen from the already formed oxides, being converted thereby into sulphuric acid, may be proven by experiments in a small way. It is only necessary to pass dry sulphurous acid gas over the different oxides, heated to a glow in a glass tube, the air being excluded. The following results were obtained from several experiments:

1. Protoxyd of copper, CuO, changed to suboxyd, which upon cooling had a dirty red color, and when treated with water showed a very perceptible amount of sulphate. While the dry gaseous sulphurous acid was being passed over the heated oxyd, a sublimate of sulphur was formed, while at the open end of the tube neither sulphurous nor sulphuric acid were perceptible.

2. Protoxyd of lead, PbO, when gently heated, glowed quickly of itself, caked together, and as the gas continued to be passed over it for a short time, a sublimate of sulphur formed near the oxyd, which appeared black next to the glowing substance. After cooling the caked substance had a black color, but when rubbed in a mortar gray, and consisted of a mixture of sulphide, suboxyd and sulphate of lead, while at the open end of the tube, during the time the sulphurous acid was admitted, neither fumes of sulphuric nor the odor of sulphurous acid were perceptible.

3. Sesquioxyd of iron, $Fe^2 O^3$, when heated, caused at once a decomposition of the sulphurous acid to sulphuric acid and sulphur; the former being perceptible in fumes at the open end of the tube, while the latter sublimed near the substance. The oxyd while hot appeared black, upon cooling, however, became red, and still consisted principally of sesquioxyd, which, however, contained traces of proto and per-sulphate.

4. Oxyd of zinc, ZnO, at a red heat, became yellow, caused a decomposition of the sulphurous acid to sulphuric acid and sulphur. The oxyd appeared, indeed, not to be changed, while a slight sublimate of sulphur was formed; after cooling, however, when it recovered its white color, it showed an admixture of sulphuric acid, and upon being treated with hydrochloric acid, gave off sulphurretted hydrogen gas, as a proof that a portion had been changed to sulphate, and another small portion to a sulphide.

From the foregoing experiments it is not only proven that gaseous sulphurous acid, when coming in contact with easily reducible heated substances, the air being excluded, changes at the cost of the oxides to sulphuric acid, but at the same time it is intimated that *when it merely comes in contact with heated solid substances* it may be changed to sulphuric acid and sulphur.

c. Experiments on the formation of sulphuric acid, as a consequence of the decomposition of sulphurous acid to sulphuric acid and sulphur, when coming in contact with heated solid substances, when the air is excluded.

In order to verify what has been said concerning the decomposition of sulphurous acid to sulphuric acid and sulphur, I made various experiments with metals, sulphur-metals, and a non-metallic substance, with the following results:

1. *Metallic iron*, in a finely divided state, heated to a glow, and anhydrous sulphurous acid passed over it, glowed of itself more strongly, causing a decomposition of the gas to sulphuric acid and sulphur, the sulphuric acid passing off as a vapor, the sulphur, however, entered partly into composition with the iron, and partly sublimed in the tube, and during the experiment became black at that part next the iron. At the conclusion of the experiment it was found that the iron had, for the greater part, been changed to a simple sulphide, a part, however, (in consequence of the action of the sulphuric acid formed,) to sesquioxyd with protoxyd, and that the black substance near the sublimed sulphur consisted of bisulphide.

2. *Metallic silver*, when gently heated, caused but a weak decomposition of the sulphurous acid. During the experiment the gas appeared to pass over the silver unchanged, but upon examining the latter after cooling, it was found that part of it had been changed to a sulphate.

3. *Metallic copper* glowed strongly, apparently there was no decomposition of the sulphurous acid which passed off. Upon cooling the copper retained almost entirely its peculiar color, but when boiled with distilled water, a small quantity of sulphate was dissolved, a proof that sulphuric acid had been formed.

4. *Protosulphide of iron* changed all the sulphurous acid to sulphuric acid and sulphur, without itself being changed. The sulphuric acid passed off as a vapor, the sulphur deposits as a yellow sublimate on the glass, at a short distance from the protosulphide of iron; this sublimate afterwards becomes black on the edges nearest the substance; upon cooling, however, it shows a red ring at the edges of the pure sulphur. Upon examination it was found that the black substance consisted of protosulphide of iron, while the red ring consisted of sesquioxyd. The protosulphide was undoubtedly excited to volatize by sulphur fumes, and the iron again partly oxidized by the action of the sulphuric acid.

5. *Yellow zincblende*, ZnS, caused but a partial decomposition of the sulphurous acid, which passed off unchanged, and the sublimate of sulphur was very slight.

6. *Quartz*, perfectly free from iron, in the form of sand SiO^3, caused at first the formation of sulphuric acid, after continued heating, however, only sulphurous acid passed off; but as a sublimate of sulphur was formed, the sulphuric acid finding no body with which it could combine, was undoubtedly decomposed as soon as formed (like anhydrous sulphuric acid when passed through a heated tube) and passed off as sulpnurous acid and oxygen.

The results of these last experiments fully confirm the supposition of the former ones, that sulphurous acid in contact with glowing solids may decompose to sulphuric acid and sulphur, according to which the disposition of sulphurous acid to change to sulphuric is so great, that in the absence of atmospheric air, or an easily reducible oxyd, it only requires a solid glowing substance, presenting a large surface, to effect the change.

Conclusions from the above experiments on the formation of sulphuric acid.

If we take all the cases in which sulphuric acid is formed, giving rise to the formation of sulphates, in the roasting of sulphur-metals and their compounds, we have three, namely:

1. That portion of sulphurous acid set free by the oxidation of the sulphur-metals, which is in immediate contact with the oxides formed at the same time, at an increased temperature, changes to sulphuric acid, at the expense of the air admitted for the oxidation of the metals, nitrogen being set free, and enters immediately into combination with the oxides formed, when these are inclined, by the temperature they have reached, to form sulphates, otherwise it passes off in the form of vapor.

2. The sulphurous acid formed in the roasting, changes to sulphuric acid, when the admission of air is slight, partly at the expense of such already formed oxides as are easily reduced to a lower stage of oxidation, uniting either with the oxides, or if the temperature is too high, is set free.

3. A part of the sulphurous acid set free in the roasting, is changed to sulphuric acid and sulphur, by contact with the substance being roasted, when there is a lack of sufficient air, or of easily reducible oxides to change it, so that at a low temperature not only are sulphates formed, but as we have seen in the experiments, some of the oxides already formed may be again converted into sulphides.

All three of the above mentioned cases may occur at the same time in the roasting of pulverized ores, or mill products consisting principally of sulphur metals, especially if the charge is a heavy one, i. e., where the substance is spread out thick, the temperature of the furnace low, and in consequence thereof, the amount of air passing in small. Although the air presses into every space containing rarified gases, and each individual particle of the sulphurmetal is converted into an oxyd and sulphurous acid at the expense of the air, the first mentioned reaction, the formation of sulphuric acid and sulphates, occurs only at the surface, and in those portions which are brought to the surface in stirring the ore, because only there is there a sufficiency of air. The other two cases, on the contrary, occur only in those portions which are already covered, or become so in the stirring, where, after the roasting has been carried on for some time, the free oxides which had been formed on the surface, are either simply reduced to a lower stage of oxidation, or unite with the sulphuric acid, or may be even again changed to sulphides, depending upon whether the sulphurous acid present is changed to sulphuric at the expense of the oxides, or whether it is changed by contact to sulphuric acid and sulphur. The two latter cases occur especially in such furnaces as are heated by a solid flame-giving fuel, where the flame is allowed to pass directly into the roasting chamber where the heat is not sufficient for the instantaneous and complete combustion of the combustible particles of the flame.

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Charcoal as a Preservative of Wood.

The enduriug character of wood which has been charred is well known. Charcoal itself is as enduring as granite; but its use in preserving wood is generally misunderstood. The cause of its preservative influence does not lie in itself, but in the fact that the heat required to produce it destroys the parasites which would otherwise destroy the wood. Wood subjected to a high steam heat, though not charred, is as capable of resisting the action of time as though it were charred. Dr. Schmoele has recently taken out a patent founded on this principle, which he sets forth as follows:

The microscopic reveals the cause of decay in wood as due to parasites feeding on the albuminous substances therein. The following conditions must all be fulfilled before decay takes piace: The presence of parasites or germs, albuminoids, moisture, free oxygen, together with a suitable temperature, and the absence of greater counteracting influences. Now, charring wood dispenses with the two first conditions, for the heat required to char the outside coating is more than sufficient for decomposing the albuminous substarces, and destroying all parasite germs. A temperature but little above the boiling point would answer for this very well. I come then to the conclusion, that for preserving wood, charring is quite superfluous, a much less heat answering equally well. On this idea, original I believe with myself, and which I claim as my invention, I base my plan for the preservation of wood. I propose to store the timber, of whatever description, in large stone or iron boxes or rooms, through which I circulate currents of hot air or superheated steam, till each piece is heated to the required degree.

This process offers the following advantages: Greater simplicity, greater cheapness, requiring no expensive chemicals, greater expedition of the work. As is well known, the albuminoids are highly hygroscopic, and in consequence expand or contract with every change of moisture in the air. Wood treated as above is no longer subject to such changes.

—It has been stated by Professor Faraday that the total quantity of oxygen daily required for the whole world is 8,000,000,000 lbs., or 7,142,857 tons.

On the Manufacture of Artificial Fuel.

PREPARED AND COMMUNICATED TO THIS JOURNAL BY PROF. H. WURTZ.

EDITORS AM. GAS-LIGHT JOURNAL:

Gentlemen: The subject of the following article, condensed greatly by me from the *Annales des Mines*, I thought would be of very especial interest to your readers at present; in view of the numerous recent efforts to introduce into this country various methods of utilizing in this way peat and waste combustibles. I would remark, however, that the conditions existing in this country are in many respects so different from those in France and Belgium, and the characters of the materials to be dealt with differ also so materially, that several variations, essential to practical success, suggest themselves to me.

I would add that this article was prepared but not published, in connection with a report made by me some time since, upon an extensive geological and chemical investigation of the interesting new mineral of Ritchie County, West Virginia; which I have named "Grahamite," in commemoration of the praiseworthy enterprise of the gentlemen who introduced it to the public as an article of commerce, Mr. John A. Graham, of New York. It is now published for the first time.

HENRY WURTZ.

[From "*Notice sur l'agglomeration des combustibles mineraux par M. L. Gruner, Ingenieur en chef des mines.*" *Annales des Mines*, 6 *ser. tome* VI. *p.* 157.]

In treating of the manufacture of coal-bricks proper we shall consider first the ordinary method, based upon the employment of a special cement, and afterwards the efforts made to obtain bricks without cement.

1. *Choice of the Coal.*—All coals are not equally fit for agglomeration. In a mining point of view we are necessarily led to prefer frangible coals yielding much culm. Such coals are generally rich in carbon and have, on this account, a very high calorific power. On this account, therefore, they are also preferable to all others. But coals altogether *lean* or free from bitumen (and above all, anthracite properly so-called) are difficult to agglomerate, their particles having little cohesion to the pitch. As soon as such a cake is put into the fire, the embedded fragments separate from the cement, unless the bricks are previously submitted to a true carbonization; as is practiced in the manufacture of "Charbons de Paris": otherwise it is necessary to mix with a lean coal 20 to 30 per cent. of caking culm. The semi-bituminous culms therefore, or an intimate mixture of lean and caking coals, are generally chosen for purposes of agglomeration. This is what is done at Charleroi, Saint Etienne, Swansea, La Grand Combe, &c. It has, nevertheles, been attempted to agglomerate long-flamed dry coals and hard lignites. But in this case, the hardness and infusibility of the small fragments render the formation of solid bricks by the ordinary method very difficult. They disintegrate in the fire still more readily than the anthracite bricks. It is thus that at Marseilles the house of Michel, Armand & Co., have vainly tried the agglomeration of the lignites of Rocher-Bleu, using the caking pitch (*brai gras*) method of Marsais of Givors. The bricks though solid when cold, tumbled into powder in the fire. To obtain a product resisting the fire, it is necessary to carbonize the mass, as is done with the "Charbons de Paris," or to heat the mixture under pressure, according to the method of Baroullier; but in both cases the major part of the volatile elements is lost. At present, therefore, the bricks are manufactured chiefly from short-flamed caking or semi-bituminous coals. When, however, as at Blanzy, long-flamed granulated coals are agglomerated, a very heavy pressure becomes necessary. If it is desired, besides, that the content of ash should be below 7 or 8 per cent., it is highly necessary to wash the coal with some care. We may add, that the more finely the culm is crushed, the more solid the cakes will be.

2. *Choice and preparation of the Cement.*—The three cements used are, crude coal tar, fat or caking pitch, and dry pitch (*brai sec*).

The fluidity of crude tar facilitates the formation of a paste. The incorporation and pressure may be effected in the cold. But bricks thus obtained remain soft, disintegrate entirely in the fire and burn with abundant smoke. This mode of manufacture can only be adopted when the bricks are roasted to harden them and eliminate their more volatile constituents. But these volatile constituents, which have at the present day acquired a very great value, are thus at least partially lost. The roasting apparatus is besides costly to build, occupies much space, and is expensive to manipulate and maintain. This system has nevertheless worked during many years at the establishment of Lodelinsart near Charleroi, and in an establishment at Marseilles belonging to the company "de la Grand Combe," also in the gas works of La Villette at Paris. There is added to the culm 8 or 10 per cent of crude tar, then the bricks are piled upon iron wagons and heated for 24 hours to about 300° (572° F.) in vast roasting chambers, The volatilized coustituents are in part condensed, it being possible to recover in this way from 20 to 26 per cent. of the tar.

But for economical reasons this method with crude tar is not to be recommended; the products are nevertheless handsome, and satisfy especially the conditions imposed by the marine, of not softening by heat, and burning without smoke. The so-called "Charbon de Paris" is manufactured in a similar manner by agglomerating with crude tar comminuted combustibles of different species, wood charcoal, peat, coke and coal-dust, wood, saw-dust, &c. The bricks are then calcined at a red heat in a close vessel. To reduce the expense, the vapors expelled are burned under the carbonizing apparatus.

Fat Pitch is concentrated coal tar, from which there has been removed by heating to 200° (392° F.) 20 to 25 per cent. of its volatile matter. It softens in the sun and becomes completely fluid much below 212° F. It may be prepared directly by distilling tar as in the works of Marsais, at Givors, or else by restoring to dry pitch a certain proportion of crude tar, as in the manufactures on Evrard's system. The fused caking pitch is mixed with coal in a heated incorporator, and the paste thus obtained pressed hot. The bricks made with fat pitch are hard and stand fire, but they burn with a black smoke and do not satisfy all the conditions prescribed by the Imperial marine. Nevertheless, the bricks of Evrard and Marsais, made with fat pitch, are highly appreciated by railroad companies, the smoke being no longer feared since the introduction of smoke-consuming apparatus. The important points are to compress the bricks well and to employ washed coal of the semi-bituminous kinds rich in carbon. The proportion of fat pitch added varies between 7 and 8 per cent. The less bituminous the coal, the more pitch is necessary.

Dry Pitch is coal tar concentrated at 280° to 300° (570° to 600° F.) and from which has been removed by distillation 35 to 40 per cent. of volatile matter. It becomes soft and pasty towards 80° or 100° (180° to 212° F.) but does not fuse at this temperature, and may be crushed to powder in the cold, if it has been sufficiently concentrated; a result which follows only when the proportion of coke, left on carbonization in a platinum crucible, is at least 45 to 46 per cent. Dry pitch has the advantages over tar and fat pitch, of furnishing immediately hard bricks which disengage little odor and smoke, and do not soften at about 50° or 60° (120° to 140° F.) But for their compression a strong pressure is necessary, and if a solid brick is required when operating on non-bituminous coals, 8 to 10 per cent of dry pitch is necessary. The crushing and fusing of the dry pitch require as much steam as the compressing apparatus.

The Belgian works at the present day, use exclusively the crushed dry pitch, and the same is the case with the works of Anzin, Aniche, Blanzy, &c., in France; but in those establishments in which Evrard's machine is used, fat pitch is mostly employed.

3. *Preparation of the Paste.*—The manufacture of a good conglomerate requires an intimate mixture of the coal and of the cement. When crude tar is used, the mixture is made cold; for this purpose is used a semi-cylindric trough 5 to 6 metres in length, in which moves a shaft carrying iron arms, to malaxate (incorporate) the paste, and a sheet-iron helix to push it gradually from one end to the other. A pump or revolving drum, pours the tar into the head of the trough, and a chain of buckets supplies the coal. In winter, and in severe climates it is necessary to heat the tar. From the trough the paste passes directly through a hopper to the compressing apparatus.

With fat pitch the paste is prepared in the same way, but with heat to fuse the cement. The fusion of the paste and the incorporation of the mass, may be accomplished either by a naked fire under the direct action of the heat, or indirectly, by means of steam under a high pressure. The direct fire was first used, according to the process of Marsais of Berard, who still operates it at the present day at the works at Givors. The apparatus consists of a cylindrical furnace, the cast-iron sole of which may be partially opened for the purpose of discharging. A horizontal shaft with blades mixes the paste, which is kept hot by a lateral fire. A charge of from 460 to 480 kilogrammes (1012 to 1056 lbs. avoirdupois) is heated in 20 minutes to about 85° to 90° (185° to 194° F.) The charging is accomplished by means of a hopper above, into which the coal is brought cold by a chain of buckets, whilst the pitch reaches it hot and fused. An analogous arrangement has been adopted at the old works, De la Motte, of the Blanzy Company, now abandoned. It is described in Payen's Chemistry, 3d edition, and in the 4th Vol. of the "Genie Industriel." This system of direct heating in an open furnace, has the inconvenience of heating too strongly certain parts of the mixture and thus occasioning partial decomposition of the bituminous cement. At the works of Martigny, near Charleroi, the incorporation is effected in a horizontal sheet iron tube 20 metres (65 feet) long, heated externally by a double fire. This system, no longer employed, partakes also of the inconvenience I have pointed out.

The heating of the paste by the aid of steam appears to have been an English invention, being proposed in a patent granted in England, August 8, 1848, to one Dobree. Upon the continent, the first application of it was made by Evrard at Chazotte, in 1853, his patents being dated January 15 and June 25, 1853. Evrard first heats the coals before mixing, then the paste itself. The comminuted coal intended for agglomeration, is poured into a sheet-iron hopper, with double walls. The steam which fills the jacket flows directly into the midst of the coal through a certain number of very small holes. This is the mode of operation at least when the coal is dry, because when it is moist, it is preferable to dry it by the aid of superheated steam simply circulating between the two walls. It is necessary that the maximum content of water in the culm should be 7 to 8 per cent. But calculation shows that when operating upon dry coal, 4 to 5 per cent. of steam only is necessary when its temperature is 150° (302° F.) to bring the coal to near 100° (212° F.)

The coal thus heated is transported by a chain of buckets into a horizontal open hopper, provided with a steam-jacket and containing a slow-moving helix, whilst the fat pitch, previously fused in a heater, is distributed uniformly over it by a special apparatus.

The helix effects a preliminary mixture, and conducts the paste into a vertical incorporator, a kind of cast-iron cylinder with double walls, uniformly heated by a current of steam. A movable shaft, placed in the axis of the cylinder, and furnished with cutting blades, effects the incorporation. The height of the cylinder is a metre and a half (58.5 inches) and should in no case exceed two metres (6 ft. 6 inches) so as not to augment too greatly the work of the bladed shaft. Thence the paste is delivered through inclined passages to the compressing apparatus, where it is sufficient that it should arrive at a temperature of 30° to 40° (86° to 104° F.) in the mean, when fat pitch is operated with. The water mixed with the coal is besides for the greater part expelled anew by the pressure which the brick undergoes in the mould; but the presence of this water

seems to facilitate the compression by favoring the slipping (*glissement*) of the particles of coal. If the coal had not been previously heated, the fat pitch would solidify on contact with it, the incorporation would be much more difficult, and the paste would only become plastic when mixed with more than 8 per cent. of the pitch. It is also evident that it is possible to reduce the proportion of pitch by effecting a more thorough heating and incorporation of the paste.

When use is made of the *dry pitch* the preparation of the paste comprises two operations, the crushing of the pitch, and the incorporation properly so-called The crushing of the pitch offers no difficulty when the temperature of the air is low, and the pitch sufficiently boiled down. There is nsed generally a conical cast-iron crusher, built upon the principle of a coffee-mill' Sometimes as at Grand, Combe, the fragments of pitch pass again, after issuing from this, between two horizontal cylinders with smooth surfaces. In order to obtain a mixture of pitch and coal in fixed proportions, a mixing apparatus of English origin is resorted to. It is composed of two contiguous hoppers of unequal dimensions: the smaller receiving the pitch in powder, the larger the comminuted culm. Each of these hoppers is closed below by a horizontal helical distributor, of which the dimensions and velocity are so calculated that the smaller permits to pass ten to twelve times ess material than the larger. The pitch and coal proceeding from these distributors, pass again between two crushing cylinders of from 0.5 to 0.6 of a metre (19·5 to 23·4 inches) in diameter. Thence the two materials pass, either directly or by means of a chain of buckets, to the incorporator properly so-called. This apparatus resembles that of the Evrard machine except that the cylinder is larger, and the steam passes directly into the annular space through many orifices, into the midst of the mass to be agglomerated. To incorporate twelve to fifteen tons per hour, there is given to the cylinder (in the Mazeline machine) a volume of two cubic metres, or two metres in height by 1·10 to 1·13 metres in diameter. But it is very evident that these dimensions are insufficient.

According to the volume of the incorporator, the material remains in it not more than from six to seven minutes and sometimes only four to five, but in this short space of time it is altogether impossible that the paste can be sufficiently softened and mixed intimately enough with the re-heated coal. Hence it comes that in the majority of cases it is necessary to reach, in most of the works, the exaggerated proportion of 10 per cent. of pitch. This, as in the product from fat pitch, is the great failing of the methods which are followed. All the attention of inventors has been devoted to the compressing machines, to the neglect of the apparatuses for heating and incorporation, and nevertheless it is the greater or less proportion of the pitch, upon which above all other things, the net cost of production depends. To me it seems that the true solution of the problem would be the elevation of the temperature of the mixture to a higher degree, by an extensive employment of superheated steam. It would appear necessary, moreovar, in order to obtain an intimate mixture of the paste, to prolong the time of continuance of the materials in the incorporator, and to increase the dimensions of the latter accordingly. But then, in order not to increase beyond measure the resistance due to the crushing of the paste, there should be employed horizontal cylinders (*cylindrés couchés*) rather than vertical incorporators. It is necessary, in a word, to seek to imitate the system of the engineer Exter, applied in Germany, to earthy lignites and to peat; a system of which we shall say some words at the end of this article.

In all cases in which dry pitch is resorted to, the paste should retain on its arrival at the moulds, a temperature of 80° or 90° (176° to 194° F.)

On a subsequent page Gruner says, that the cost of preparing bricks containing 8 per cent of pitch is in France about 7 francs per ton, but believes that by making use of drying apparatus, and compressors better arranged, this price ought easily to be reduced to 5 francs per ton.

Sodium Amalgam.

(From the London Mechanics' Magazine of Nov. 30, 1866).

Among the latest discoveries and inventions having for their object the successful mining and treatment of the various metalliferous ores, few are more worthy of attention than the process of sodium amalgamation. The metal sodium was discovered by Sir H. Davy, almost immediately after potassium, but he could only produce it in small quantities. Since his time, however, as the demand has greatly increased, means have been found to increase the supply in proportion, and, principally by the exertions of M. St. Claire Deville, the cost of it has been considerably diminished. Hitherto, the principal use of sodium has been in the manufacture of aluminum, which is now carried on to a considerable extent. But sodium has now received a new application as an agent for facilitating the obtaining of precious metals by the process of mecurial amalgamation. By the union of metallic sodium with mercury the affinity of the latter for other metallic substances is found to be indefinitely increased. The honor of having discovered the Sodium process is generally conceded to Professor Henry Wurtz, of New York; and the value of the discovery has been placed beyond doubt by practical application in America, in which country it has been largely introduced in mining operations. Owing to the comparatively limited number of gold mines in our own country, but little attention has hitherto been given to the question. One or two failures have occurred which have acted as a check upon further trials, and have been erroneously accepted as conclusive evidence of the impracticability of the process. In America, however, where the mines of precious metals are more numerous, the case has been different; the idea, once started, was carefully and patiently worked out in practice until it became an established fact. The mercury prepared with sodium has received the name of "Magnetic Quicksilver," on account of its powerful attraction for the particles either of gold or silver.

Until the introduction of sodium amalgam considerable loss of gold was frequently experienced, where the metal was under treatment in contact with mercury. In some samples of waste, or, as it is technically termed, "tailings," collected by Professor B. Silliman, at various amalgamation works in Grass Valley, California—a place noted for successful results in gold amalgamation—he found upon assay a yield of over 30 dollars to the ton in the quartz waste, and over 50 dollars to the ton in the sulphides. This loss was nearly equal to the average amount saved in the district, a very unsatisfactory discovery for the gold-seekers to make. Various causes come into operation to produce this loss; amongst others are imperfect processes, insufficient comminution of the ore, and the difficulty in bringing the gold into contact with the mercury. But often when the gold is brought into contact with the mercury the latter appears sluggish and indifferent to the gold, failing to amalgamate with it. Sometimes a minute portion of grease may have found its way into the amalgamator, and this will effectually check the process. But this indifference may as often be due to some other and less obvious cause, which frequently baffles the skill of the best amalgamators, and results in ruinous loss of the precious metal. Many attempts have been made to save this loss and to avoid the causes which involve it, but most of the methods proposed have met with very indifferent success. It was at one time thought that the use of mercurial vapor would prove an effectual remedy, and the process promised well experimentally, but upon trial in a large way it altogether failed. Thus the problem of a better yield of gold remained in a great measure unsolved until the introduction of the new process by Professor Wurtz, which appears likely to take rank among the most useful discoveries of our time. By this discovery we have a minute portion of the metal sodium imparting to mercury the power of readily amalgamating with gold, under the adverse conditions which had previously proved a serious drawback to the process. One of the alloys thus formed, containing about 2 per cent. of sodium, melts below 212° Fahr. Another, containing about 4 per cent., is a hard brittle solid, remarkably infusible, and requiring a temperature nearly as high as the fusing point of type metal to melt it. This harder form of alloy may be cast into ingots, and packed either under petroleum or in air-tight iron cans, filled with dry lime. It may be fused in free mercury, at a temperature below its point of vaporization. For practical use, however, it will doubtless be found more convenient to employ one of the more fusible alloys of sodium. In this case the most convenient method of transporting the amalgam is by means of the ordinary iron quicksilver bottle, which should be filled and tightly closed. No other protection from the air is necessary, and for use the bottle has only to be placed in boiling water for a short time, when the alloy will become liquid, and in a condition to charge the ordinary quicksilver.

Having stated in general terms the high efficiency of this process, we will next give the results of some experiments which were carefully carried out on a somewhat extensive scale by Professor Silliman. [These results having been already widely published in our newspapers nearly a year since, may be omitted here.]

There are various theories afloat concerning the way in which the sodium acts in thus facilitating the process of amalgamation. Professor Silliman considers the action of the sodium to be in a manner electrical, by placing the mercury in a highly electro-positive condition towards the electro-negative gold. Others suppose that the sodium acts by its chemical affinities, but then the quantity of the metal present is so small as to render this proposition untenable. It is well known to chemists that the metallic sulphides are decomposed by amalgam of sodium, but, says the Professor, no one supposes that an inventor could be found so Quixotic in his chemical notions as to seriously propose the use of sodium amalgam as a means of effecting the reduction of the sulphides of silver, &c., since not less than one equivalent of sodium would be required to set at liberty one equivalent of silver. The use of sodium amalgam for silver amalgamation must depend upon a like power of electrical action to that seen in its action on gold, and also to the well known power of preventing the granulation (flouring) of mercury, or of saving the mercury when thus changed. In fact, it is believed that sodium amalgam plays a most important part in this particular respect. It is well known that there is a great liability in gold and silver amalgans to granulate and disappear entirely from the plates of the battery, or from the riffles, after it has once been formed. When this happens with the ordinary methods af amalgamation, it is almost impossible to recover the minute particles, which are carried off with the current of water and are lost. Now it is one of the peculiar properties—perhaps the most remarkable—of the sodium, that it recovers the mercury which has passed into this condition. Altogether the question of sodium amalgamation is a new and interesting one, and seeing the success which has attended its practical application in America, we recommend our own gold-seekers in the principality to investigate the question a little more closely. Let them impart a little more science into the matter and *try again*; we cannot see why the same happy results should not accrue to them as to our transAtlantic friends.

A New Style of Ordnance.—Senor Gonzales a Mexican, has applied for a patent for a new breech-loading cannon. It is of the ordinary shape, except the breech which is heavier than usual, and oval in form, with a projection on the under side. At the butt is a screw-plug, in which is an opening twice the size of the calibre of the gun, through which the cartridge is introduced. By turning the plug the breech is closed. It is claimed that it ean be loaded and fired sixteen times per minute. Experiments have been made with it at the Presidio which have proved satisfactory.—*San Francisco Bulletin*,

Speed of Mechanical Force.—If a continuous solid iron rail was laid along a track for a distance of 150 miles, no amount of force applied at one end could move the other in less than one minute and a quarter, the time required for mechanical force to travel in iron that distance.

Correspondence.

HYANNIS, Mass., December 22, 1866.

EDITORS AM. GAS-LIGHT JOURNAL:

Gentlemen: In your journal of November 17th a communication appeared from X, respecting the durability of mastic made of coal tar and sand. Now, X in *trying* to answer that question by a Yankee method shows that he has an interest in the Plastic Slate, or else has not the ability to answer the question in a straightforward manner, but goes on to say that wheat flour and water will make a solid when dry. *Ergo*, will sand and water make a solid when dry? Now, I ask, will slate flour and water make a solid when dry? It is not even a good syllogism, no more than a good fact. Then X goes on to say that when coal tar is exhausted by evaporation, you will have sand and not sandstone. Granted, *if the tar ever evaporates.* I can show him where tar has been on for eighteen years and it is not evaporated yet, and allowing for all evaporations, it is still good for 18 years longer. Then, again, he says that coal tar and sand has been on trial for ten years, and it will not work *Ergo*, Benjamin Franklin caught the horse, but the horse was harnessed by Professor Morse. So much for X.

Now, I will answer his question in a straightforward manner. Will coal tar and sand make a durable roof? I answer, from experience, No, it will not. The tar being in its natural state, on being exposed to the atmosphere, separates itself from the sand; then, as reason teaches us, the sand is either blown or washed away. That has been my experience, not only with sand, but all other earths when mixed with coal tar in its natural state, Again, from experience, a chemical union can be formed of coal tar and sand, or other earths, which will, when intimately mixed together form a firm, elastic water-proof and fire-proof cement, which will not run in the hottest nor crack in the coldest weather, and, in my opinion, more durable than any roofing yet invented; it can be put (and *will remain* where put) on walls of buildings, or roofs of any pitch. The above cement is made simply by neutralizing, or evaporating those qualities of the tar which are adverse to adhesiveness, care being taken in choosing those earths in which the attraction of cohesion is easily overcome, accordingly the particles of the different earths are intimately mixed together; thus, when mixed with the tar form an equable diffusion throughout each other in a mass. If any of your readers will try the above I should like to hear from them. H.

MADISON, N. J., January 4, 1867.

EDITORS AM. GAS-LIGHT JOURNAL:

Gentlemen: In your *Mining Journal* I noticed some time since, an article in regard to the gold mines of Vermont, and mention was made of some of the different claims there, a statement concerning which I was glad to read. The fact of gold mines being so near us and no more attention paid to them, reminds me of a conversation that took place in New York last season, between two Californian miners: A said to B, "What do you think of the mines in Vermont, near Bridgewater?" B, who had just returned from Vermont, having examined the mines said, that "If they (the mines) were in California or Nevada, or a thousand miles from San Francisco, thousands of men would be rushing there, and the whole district would be taken up and built up in three months, and it would be considered a first-class district for mining, but here, because it is so near by, no one has confidence in the ores, and take no pains to investigate the mines." I showed many samples of the ores to different California miners and they pronounced them good; in many specimens free gold was visible to the naked eye, similar to the ores of Gold Hill, Nevada, and also resembling the famous leads in Grass Valley, California. They have been crushing for years ores that would not pay more than from $10 to $15 per ton, and have made it profitable, whereas in Vermont several claims bid fair to pay much more, say from $15 to $30 per ton, even for the short depth that some of them are opened: for it is a well-known fact in California mining, that at the depth of 200 or 300 feet from the surface, the leads are larger and pay better than near the surface, and in some cases parties have gone down on their lodes eight and nine hundred feet, with fine results.

During the past season work has been constantly going on in the Vermont lodes, and the parties are very confident of success and large returns, as soon as they have obtained a sufficient depth.

A few statements from a private letter received by me from a very reliable party at Bridgewater, Vt., may be of interest, although no portion of the letter was intended for publication. The letter bears date December 29th, 1866, and the writer says: "I showed the Daly, now the Vermont Company's mine, to Professor Shephard, of New Haven, Conn., and he pronounced it to be a very fine looking lead. There has been four or five new openings made in Bridgewater this fall, and all promise well thus far. Mr. A. is now working eight men, and thinks he has got a rich mine. I think I informed you of the amount of gold that was taken from ten tons of the Taggart ores—377 dwt. 22¼ carats fine, and all other tests that have been worked at W's. mill, have proved well thus far, and I do not see any good reason why the Daly and Cox properties (now the Vermont and Atlantic Companies,) do not bid fair to be as rich in gold as any of the leads that have been opened; yet when I left Bridgewater, some five weeks since, everything in the mining department was looking better than I had ever seen it before. I think there will be from four to six mills put up the next season. I have one company formed from Oxford N. Y., and three in Vermont; men that have opened their mines and are looking for a great return from their money, and I have two or three other parties that are now expecting to commence work in the spring."

Thus you see that there is some work going on, still scarce anything is known concerning the mines. After a very careful survey and thorough examination of the different mines in Vermont, I must say that the district holds out good opportunities and inducements for men to take part in the mining interests, as much so as in the many gold mining districts of California and Nevada, and by a little patience and hard work, they will find it a profitable investment. There is more of the Gozen ores in the Vermont mines as a district, than I even found in any mining district in California in seven year's experience. This coming season, we that are interested there, are expecting to achieve rich results.

O. P. Q.

PATENT CLAIMS.

Pertaining to Gas, Mining, Petroleum, Water, etc.

For the week ending January 1, 1867.

60,670.—CAPILLARY MATERIAL FOR FILLING GAS AND AIR CARBURETTERS.—John A. Basset, Salem, Mass.:

I claim an absorbant and capillary material for gas and air carburetters, composed of the substance described and prepared substantially in the manner set forth.

60,674.—GAS BURNER AND REFLECTOR,—Herman Berg, and Andrew Blessing, Springfield, Mass.:

I claim as a new article of manufacture a gas burner having a globular or dome-shaped reflector arranged between the lights of the same, substantially as herein set forth.

60,739.—QUARTZ MILL.—Gilbert D. Jones, New York City:

I claim the adjustible or rising and falling scrapers, M, and the fixed scrapers, G, arranged and applied to operate substantially in the manner as and for the purpose set forth.

60,757.—DEODORIZING PETROLEUM.—Orazio Lugo, New-York City:

I claim the use of chromic acid and hypochlorite of soda, or their equivalents, for the purpose of deodorizing offensive smelling kinds of petroleum.

60,756.—WATER WHEEL.—George W. McCann, Springfield, Ohio:

I claim 1st. The wheel, D, with two or more series of buckets, substantially as described, in combination with the independent gates, H, H, for the purpose set forth.

2d. In combination with the gates, H, H, the springs, N, N, substantially as and for the purpose set forth.

60,830.—ROOFING MATERIAL.—John F. Boynton, Syracuse, N. Y.:

I claim, 1st. The combination of peat with gas tar products, as and for the purpose described.

2d. The combination of muck with gas tar or gas tar products, as and for the purpose described.

3d. The combination of ground ligneous and fibrous materials, peat and muck, with gas tar or gas tar products, for the purpose described.

4th. Peat, muck, and disintegrated ligneous and ground fibrous materials, combined with asphaltums, gas tar and its products, substantially as set forth and for the purpose herein described.

5th. The combination of the silicate of soda, silicate of magnesia, and the chloride of calcium, for the purposes above specified.

60,857.—APPARATUS FOR CHARGING GAS OR AIR WITH HYDRO-CARBON VAPOR.—W. H. Burridge, Cleveland, Ohio:

I claim, 1st. The stepped or shelved partitions, provided with basins or cups and flocculent material, in combination with the case, A, substantially as and for the purpose set forth.

2d. Arranging the steps or pans so as to enlarge the area or surface of the same from top to bottom, and so that the evaporating capacity will be increased in proportion to the increasing density of the fluid by the illumination of the lighter portions.

3d. The plate C, volute curtains, C, in combination with the partitions, B, arranged substantially as and for the purpose set forth.

60,976.—STEAM GENERATOR.—Henry Fegh, assignor to himself and George P. Emery, Columbus, Ohio. Ante-dated September 18, 1866:

I claim, 1st. Pipes or tubes leading from the main water chamber through the fire-box and communicating with pipes or tubes which also lead through the fire-box but which enter a water chamber, E, that extends above the water-level, for producing a forced circulation of water in steam boilers, substantially as described.

60,925.—LUBRICATING DEVICE.—George M. Morris, Cohoes, N. Y.:

I claim the within-described lubricating device, consisting of the slotted hanger. A, slotted journal-box, C, disk, M, spring, b, oil cup, D, and groove or channel, c, c, all combined and operating, as and for the purpose set forth.

60,937.—LAMP CHIMNEY.—Charles H. Reichmann, New York City:

I claim a glass chimney for lamps constructed of two sections, the adjoining parts of which are provided with flanges, a, b, held together by a narrow metal band slipped over the upper part and resting on its flange and sprung over the flange of the lower part.

60,943.—STEAM ENGINE.—Hamilton Ruddick, Boston, Mass.:

I claim the arrangement of piston heads, B. B, rods, b, b, connecting-rod, D, and crank, E, relatively to each other and the cylinder, A, substantially as described.

THE

WASHINGTON MILL

AND

SILVER MINING COMPANY

OF ECHO DISTRICT, HUMBOLDT CO., NEVADA.

Capital Stock $300,000,

Issued for Mining Purposes.

60,000 Shares at Five Dollars each.

OFFICERS:

President—J. Clements Stocker.
Vice-President—John J. Thomas.
Secretary and Treasurer—Henry Lee Reynolds.
Superintendent—William S. Sargent.

TRUSTEES:

J. Clement Stocker, New York City.
John J. Thomas, New York City.
Lewis W. Phillips, New York City.
E. Page Davis, Unionville, Nevada.
Henry Lee Reynolds, New York City.

Office of the Company, 30 Pine street, New York.

☞ The Mine of this Company rapidly approaching that point of development which will necessitate the erection of a Mill, the Trustees are authorized to dispose of 10,000 shares of the reserve capital stock.

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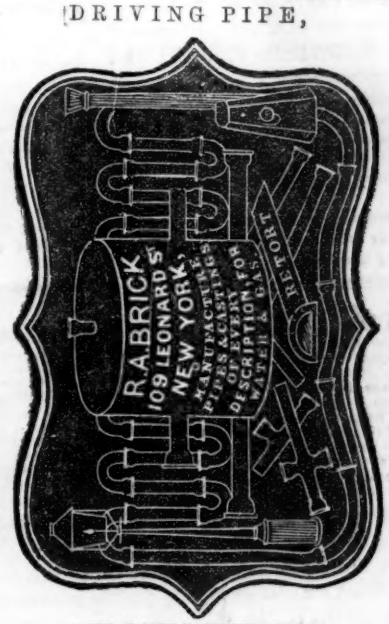

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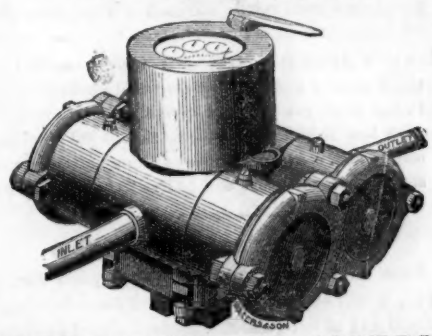

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WEDNESDAY, JANUARY 16, 1867.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its colums are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

SUBSCRIBERS would confer a favor upon us by remitting CHECKS or POST OFFICE MONEY ORDERS, as we are frequent losers where money is enclosed in letters.

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Answers to Correspondents.

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Electricity and Telegraphy.

Soon after the discovery of the Leyden Jar, in 1747, it was observed that the shock passed through 12,000 feet of wire, affected persons placed at either extremity, apparently at the same instant of time. The idea of the instantaneous passage of electricity was probably thus first received, and it was forced, by new observations on the attention of all succeeding generations.

Reizen proposed a telegraph with thirty-six complete circuits, one for each letter and number, in 1794. A telegraph was constructed by Betancourt in 1798, employing the spark between Madrid and Avanjuez, twenty six miles.

The first year of the present century was memorable as having produced the Voltaic or Galvanic battery. Soemering improved telegraphy by decomposing water with gold points or pins to indicate the letters of the alphabet. This was in 1809. It was in 1816 that Dr. J. R Coxe, of Philadelphia, proposed a similar apparatus, and predicted the ultimate success of the telegraph. The first registering apparatus seems to have been constructed in 1826, by Mr. Harrison Gray Dyar, of Long Island, who used the spark to decompose moist litmus paper, moved by clock-work, to produce dots and combinations to designate the alphabet.

The fact that a magnetic needle is deflected by a current of voltaic electricity passing at right angles to it, was discovered by O. Ersted in 1819. The electro-magnet was discovered by Ampere in 1820, wherein a piece of soft iron is rendered temporarily a magnet, by a coil of wire surrounding it during the passage of a current of galvanic electricity through the coil.

The deflecting needle telegraph was described by Ampere in 1820 and 1822. The invention was introduced in Russia by Schilling in 1632; by Gauss and Weber in 1833 at Gottingen, and improved and largely introduced by Wheatstone in England soon after, where it is now used. Steinheil introduced it at Munich in 1837, and this seems to have been the first electro-magnetic telegraph on record which employed a registering apparatus. The deflection of his needles moved little levers, carrying pen-points, which marked dots or short lines on a fillet of paper, moved by clock-work, as had been done by Dyar previously with common electricity, and as was subsequently done by Professor Morse, and brought into use in this country. The next step in improvement was the use of the electro-magnet. In 1830, Professor Joseph Henry, of the Smithsonian Institute, by experiments with powerful electro-magnets and long conductors, proved that this form of telegraph was practicable, and published a paper on the result of these experiments, applying the new facts to the idea of the construction of the telegraph.

In 1844, Professor S. F. B. Morse employed the registering telegraph in combination with the electro-magnet, upon a line between Baltimore and Washington. This improvement was filed in Washington as a caveat in 1837, and is said to have been conceived by him in 1832. This telegraph, together with the House printing telegraph, and the Bain decomposing telegraph, are the systems principally in use in this country.

In all these systems of telegraphing, where the Voltaic electric current as it is called is employed, it is generally supposed that a current of electricity passes or travels from the decomposing cells or battery to the recording instrument at the other end of the conducting wire, and through the coiled wire about the soft iron bar, to convert it into a temporary magnet, which draws down the soft iron armature to actuate the lever and marking style or point, or other mechanism for forming characters. It is supposed that a certain amount of time is taken up in the transmission of this electric current, although it is almost inappreciable, where the conducting medium is good and sufficiently large to give "free passage" to the "electric current" as it has been expressed.

Like light, electricity is an imponderable fluid or agent, so exceedingly ethereal and subtle, as to be entirely beyond the reach of those tests by which we gain intelligence of material or physical matter. It has neither length, breadth, thickness or weight, and we can only observe its manifestations upon matter, to form an idea of its character. It may be considered an exceedingly ethereal element pervading all matter, only discoverable to our senses by its effect upon matter, when its equilibrium is disturbed. The thunderbolt affords a grand and impressive illustration of this, when a surcharged cloud sends forth its pent up power to establish its equilibrium.

It is a question of discussion among scientific men, whether a conductor, as a telegraph wire for instance, gives passage to a "current" of electricity, as it is called, which passes from one end to the other, or whether its normal condition is not simultaneously changed by a species of induction, similar to the reaction which causes the last of a series of ivory balls suspended in a line, to fly off at a tangent when the first ball is struck a light blow, without any apparent motion of the intervening balls. It can hardly be said that the force "travels" from the first to the last ball, or that a "current" of force passes through or over them. They are the medium that transmits the force, and such would appear to be the office of an electric conductor, to transmit the electric force or agency from point to point, by a sort of induction or reaction.

The Value of Town Sewage.

Professor Liebig has sufficiently shown the value of economizing sewage, not only theoretically, but practically as worked out in accordance with his plans and under his supervision lately in London, and the results have proven to be of the most stupendous character. When we consider the simple nature of the operations whereby such results are obtained, the great importance of saving those substances which have heretofore been lost, and in being lost have been a source of serious inconvenience and detriment to the health of the populace of all towns and cities so situated, that the sewage as in London, enters the free waters surrounding them to contaminate them, and poison the atmosphere as well.

The great value in an economical point of view to be derived from the application of sewage for agricultural purposes, is shown in the following experiments at Edinburgh, where a portion of sewage was applied to some meadow-land near by, summed up in the fact that the proprietor realized the sum of $862,000 by an outlay of $22,500 in putting under irrigation about 250 acres of his land with a portion of the sewage of that city:

"The question of the utilization of the sewage from towns and cities, is at the present time attracting a large share of attention among both practical and scientific men in Europe; and numerous experiments are in progress similar to the one cited above. We presume in that case the land was situated at a lower level than that portion of the city from whence the sewage was obtained; and that it was taken to the land by artificial drains, and not by cartage. When agricultural lands are thus situated, relative to city drainage, there can be no question as to the practicability of utilizing such drainage; but when the conditions are such that drainage must be moved by cartage, and perhaps artificially prepared, the utilization thereof must be a matter of close calculation. There are those, however, who are working heartily at the problem, and express the fullest confidence in being able to show that the drainage of almost any large town may be thus economized. The city of London is one to which much attention is now being given in this direction. The experiment cited above is certainly a most encouraging one, and leaves a large margin for unfavorable conditions."

The city of New York affords sewage worth many millions of dollars, if properly economized and applied to the many acres of land that surround it, within a reasonable distance. The same is true of other cities and towns.

We venture to assert that scientific men and inventors can find no more promising field to exercise their peculiar talents, than to devise a simple and cheap method whereby the sewage can be saved and transferred to the places where most needed.

It would seem that by means of large cisterns or reservoirs, placed under lateral and inlet sewers, would form a sort of trap where the solid materials would settle. A sort of inverted strainer or filter should be placed at the outlets at the top to retain most of the impurities, and the water would thereby be so purified as to be comparatively free from noxious exhalations, by the time it reached the main outlets.

The traps or sediment receptacles could be emptied by pumps into close carts, or boats if near the water front of the city, to be conveyed to the place where it is to be used. Of course deodorizors and chemical agents would be used to make the plan complete.

Fire Damp—Gas Explosions.

The late disastrous accidents, attended with such appalling loss of life, in the coal collieries of England, by the explosion of fire-damp (carburetted hydrogen), and the frequent accidental explosions of coal-gas (light carburetted hydrogen), as instance the fatal explosion at Nine Elms, England, and the late destructive explosion at Astoria, L. I., together with the frequent loss of life, owing to the escape of gas into sleeping rooms and elsewhere, from carelessness in turning off the gas, or to some flaw or leak in the pipes or fixtures, seems to call for some simple and cheap invention of easy application, whereby the nature of any atmosphere may be known, and danger of explosion prevented.

In this connection we are led to notice an instrument described in the *Journal of the Franklin Institute*, invented by Mr. G. F. Ansell, of England, which takes advantage of Professor Graham's law of gas diffusion, for the purpose of ascertaining and giving warning of the presence of accumulations of fire-damp in coal mines.

The apparatus is a glass U-tube, having one aperture closed with a plate of graphite or equivalent porous diaphragm, and a few inches of mercury in the bend. If this instrument, filled in the first instance with air, be placed under the influence of an atmosphere containing five per cent., or even less, of light carburetted hydrogen or marsh gas, the presence of such moisture will be instantly detected by the passage of the gas through the interstices of the graphite, and the consequent explosion in volume of the gaseous contents of the tube; the column of mercury then rises in the opposite limb of the apparatus, and is made to record itself, either by completing the circuit of a voltaic alarum, by deflecting a galvanometer needle, or lastly, by an adaptation of the simpler mechanism of a wheel barometer.

We suggest to inventors to apply this principle to ring an electric alarm bell, to give notice of danger at any hour of the day or night. It occurs also that this principle could be used to indicate the actual quality or illuminating power of coal gas, by a species of barometer to operate an index needle and dial, so marked with figures as to show the quality or candle-power of the gas, at a glance.

Mining Shares—Gas Stocks.

That mining shares at the present, as a general thing, are as safe and remunerative for investment of capital as any other to be found in market, is getting to be pretty well understood by those who look carefully into these matters.

If mining shares generally were more readily negotiable, so as to be used more freely in the ordinary transactions of business, there is no doubt they would be more sought for among capitalists than heretofore, because of the much better interest they pay than most other investments.

In an English journal we not long since saw, a careful calculation was made, which proved that 350 mines comprised in the Mining Share List, paid, on the average, *three times* as large dividends as the average paid by railways, canals, bridges, navigation, dock, or land companies etc. The figures were as follows:

"British railways, including preference shares, mortgage loans, etc., pay on the average 3¾ per cent.

"The 350 mines in the Mining Share List, including copper, lead, tin, 13½ per cent.

"Showing an advantage of ten per cent. on investments in sound mining adventures."

These remarks in regard to mining shares, will measurably apply to this market.

Gas Stocks, as a general thing have not been much sought for, more especially since the advance in the price of coal and labor. In some cases, as in the Manhattan, the charter of the company does not allow to increase the price to the consumers in any degree proportionate to the enhanced cost of manufacture.

The gradual decrease, however, in the price of coal and labor as gold continues to decline, is beginning to cause gas shares to improve somewhat in market, and from information we have of late improvements in the manufacture of gas, whereby a large saving in the cost is obtained, it is quite certain that the time is not far distant when the holders of gas stocks will be agreeably surprised to find good fat dividends coming in. We shall have more to say about this, anon.

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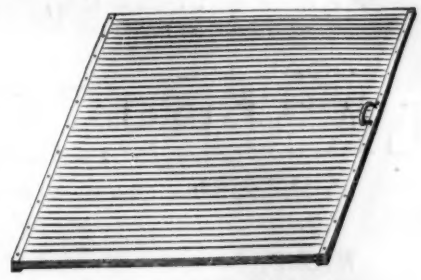

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Amidon's Improved Clothes Wringer,

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Manufacturer and Jobber of

LAMPS,

Petroleum Stoves, &c.

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WICKS, &C.,

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ALL ORDERS promptly filled for his Patent Petroleum Stoves or Lamp Heaters, which are acknowledged to be superior to any other article of the kind now in use, as regards economy in consumption of oil, as well as simplicity of construction.

These Cooking Apparatus are used like any coal oil lamp, being provided with a sheet metal chimney, in consequence of which they burn without odor or smoke. They radiate no heat into the room, and are therefore very desirable in hot weather.

Also, Nursery and Night Lamps combined, a superior and cheap article for nursery or sick room; has a kettle, cup and pan, complete.

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Helical Jonval Turbine Water Wheel,

For first-class mills and factories where great economy of wate and simplicity and durability are required.

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☞ Stevenson's Jonval Turbine Water Wheel gave the highest per centage of power over all others at the trial of Water Wheels at Fairmount Works, Philadelphia, March 9th, 1860. NINETEEN WHEELS WERE TESTED. The only practical test on record.

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With STEARN'S PATENT SETS, far superior to Rack and Pinion and Screw sets. Years of wear will not cause lost motion. All plank sawed with perfectly even thickness. No time lost in setting. Suitable for sawing any kind of Lumber and Timber.

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OF ALL SHAPES & SIZES,

Fire Mortar, Clay and Sand.

☞Articles of every description made to order, at short notice. (135

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☞ *Established in* 1845, ☜

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GAS RETORTS, TILES and FIRE-BRICK of all shapes and sizes.
FIRE MORTAR, CLAY, and SAND.
Articles of every description made to order at the shortest notice.
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PRINCE'S METALLIC PAINT.

AN INDESTRUCTIBLE COATING FOR

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It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals, without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though said at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, ouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral paints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Five Cents per Pound.

A liberal discount made to parties purchasing by the ton.

A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

Also, Prince's Imperial Black Paint, and Prince's Protoxide of Iron.

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At prices within the reach of every Church, School, Cemetery, Factory, or Farm in the land. Their use throughout the United States and Canadas for the past six years has proven them to combine most valuable qualities. Among which are TONE, STRENGTH, SONOROUSNESS, and DURABILITY OF VIBRATION, unequalled by any other manufacture. Sizes from 15 to 5,000 lbs., costing TWO-THIRDS LESS than other metal, or 25 cents per pound, at which price I warrant them twelve months. Old bell metal taken in exchange, or bought for cash. Send for a circular to the manufacturer,

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Weight of Bells.	Diameter.	Price of Bells without Hangings.	Price of Patent Hangings.	Price of Bell and Hangings complete.
225 lbs.	26 inches.	$56 00	$15 00	$71 00
275 "	42	69 00	18 00	87 00
375	36	94 00	22 00	116 00
450	84	112 00	25 00	137 00
600	02	150 00	30 00	180 00
750	39	188 00	35 00	223 00
1,000	64	250 00	42 00	292 00
1,200	48	300 00	45 00	345 00
1,400	50	350 00	50 00	400 00
1,600	52	400 00	54 00	454 00
1,800	55	450 00	60 00	510 00
2,000	58	500 00	62 00	562 00
2,500	60	625 00	72 00	697 00
3,000	63	750 00	85 00	835 00
3,500	66	875 00	87 00	962 00
4,000	69	1,000 00	100 00	1,100 00
4,500	72	1,125 00	113 00	1,238 00
5,000	75	1,250 00	125 00	1,375 00

List of Prices, Weights, and Sizes of Farm, Hotel, Steamboat, Schoolhouse, Shop, and Factory Bell.

These Bells are fitted with Yoke, Standard's Crank and Bolt, complete for use.

Weight of Bell and Hangings.	Diameter.	Cost of Bell and Hangings complete.
15 lbs.	7 inches.	$3 75
20	8½	5 00
35	10	8 75
50	12	12 50
75	16	18 75
100	18	25 00
150	20	37 50
200	22	50 00
250	24	62 50

Larger Sizes made to Order at 25 cents per pound.

Guarantee.—All Bells sold at the above prices WARRANTED against breakage by fair ringing, for TWELVE MONTHS from time of purchasing. Should one fail, a new bell will be given by urning the broken one.

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In case a Bell breaks after the expiration of the Warrantee, I allow HALF PRICE for the old metal. JOHN B. ROBINSON, 36 Dey Street, N. Y.

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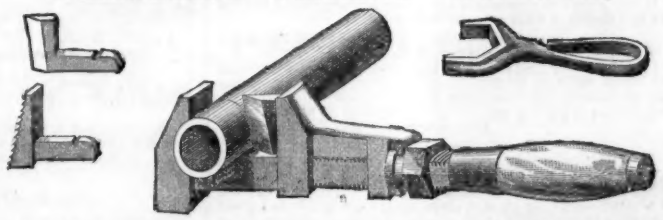

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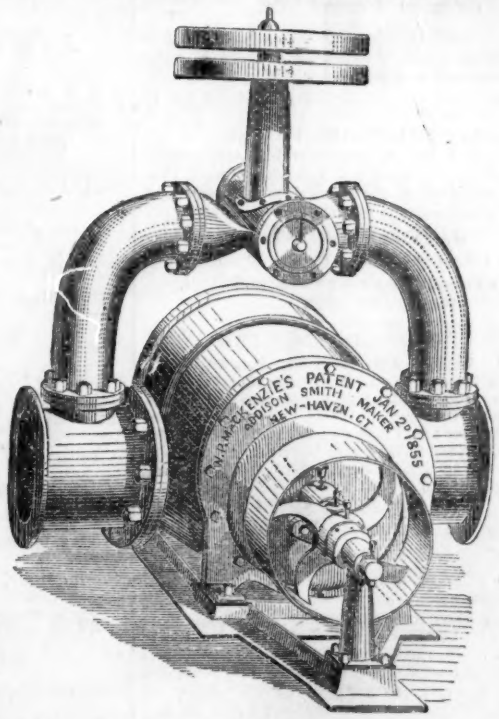
Smith & Sayre Manufactnring Company.

The Mackenzie Patent Gas Exhauster,

AND PATENT COMPENSATOR.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 ons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. fuel. Address

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GAS-METER GLYCERIN.

WE SOLICIT THE ATTENTION OF GAS COMPANIES to our GLYCERIN, which is now generally known, and is undoubtedly the best article ever used for filling Gas meters. Glycerin of 15° Baume will stand 14° below zero without freezing, and the greater the density the lower the temperature it will stand.

We have sold to most of the large companies throughout the country, and annex a few certificates showing its value:

OFFICE OF THE CINCINNATI GAS-LIGHT & COKE CO., CINCINNATI, OHIO, Nov. 25, 1865.

I take pleasure in stating that the glycerin furnished by W. J. M. Gordon & Bro., of Cincinnati, has been used in wet meters by this Company during the past two years, and has proved very satisfactory thus far. Having resisted the action of frost, and not evaporated more than about six per cent. each year.

The standard for density being 15° Baume's scale.

H. I. MILLER, President.

OFFICE GAS-LIGHT CO., BALTIMORE, Dec. 16, 1864.

MESSRS. W. J. M. GORDON & BRO.—Of the numerous fluids used by this Company in their gas-meters to prevent freezing, none have given the satisfaction of the Glycerin manufactured for that purpose by the Messrs. Gordon & Bro., of Cincinnati, Ohio. As Glycerin will withstand a temperature below anything in the latitude of Baltimore without congealing, and as it does not evaporate like the alcoholic mixtures, once filling a meter will last for years. Yours respectfully,

J. MORTON SAUNDERS, Engineer.
COLUMBUS O'DONNELL, President.

Glycerin for Printers' Rollers.

It is coming into general use for this purpose, as rollers will not dry and shrink as when made in the usual way.

OFFICE OF THE DAILY & DOLLAR WEEKLY TIMES, CINCINNATI, Nov. 27th, 1865.

I hereby certify that I have used the Glycerin manufactured by the Messrs. W. J. M. Gordon & Bro., of this city, in the manufacture of printing rollers, and find it a most valuable addition to the composition in general use. THOMAS F. WINTER,
Pressman Times Office, Cincinnati, O.

November 29, 1865.

We have used the Glycerin manufactured by W. J. M. Gordon & Bro, of this city, for the last seven years. We find it in our line of business—printing playing cards, using colored inks to a great extent,—a very superior and indispensable article. We use about one-sixth quantity of it to the amount of molasses in making our rollers. We find it prevents them from shrinking up, and causes them to retain the desired "tack." We confidently recommend the article for the desired purposes. LONGLEY & BROTHER,
Playing Card Manufacturers, Cincinnati, Ohio.

Glycerin is also used by the Cincinnati Commercial and Enquirer, to whom we refer.

We manufacture Glycerine of every quality used, and from our advantage in material we are enabled to sell it lower than any manufacturer in the country.

W. J. M. GORDON & BRO.,
MANUFACTURING CHEMISTS AND DRUGGISTS.
63] N. E. Cor. Central-ave. and 8th-st., Cincinnati, Ohio.

GLYCERIN

For Wet Meters, Gasoline Machines, Hydraulic Presses, &c.

We warrant our Glycerine free from acid and not to corrode the Meter metal, or to congeal or freeze at a stated temperature—also, not to evaporate to any extent The advantages and savings derived from the use of our fluid can be testified by many Gas Light Companies which we have supplied. We only refer to the certificates of H. J. Miller, Esq., President of Cincinnati G. L. and Coke Co., and Dr. J. Lawrence Smith, Professor of Chemistry in the Louisville College, and President of the Louisville Gas Co.

HARTMAN & LAIST,

Office No. 41 East 2d street, Cincinnati,—Chemical Works on Providence street, and Miami Canal, near Findlay sreet.

CERTIFICATE

Office Louisville Gas Co., Louisville, June 28, 1865.

This is to certify, that the Louisville Gas Co. have used for about two years, the Glycerine prepared by Messrs. Hartman & Laist of Cincinnati, in their Wet Meters, and have in all instances found it to give most perfect satisfaction. Prior to the use of the above Glycerin, we had employed that manufactured by other parties, and we consider H. & L.'s superior to any we used.

J. LAWRENCE SMITH, President.

Office Cincinnati Gas Light and Coke Co., July 7, 1865.

This will certify, that Messrs. Hartman & Laist of Cincinnati, furnished this Company with Glycerin for Wet Meters some two years since. It has proved very satisfactory, having resisted the action of frost during two winters and evaporating not more than six per cent. per annum, as guaranteed by them. The standard being, for density, 15 deg. Beaume's scale. They were the first to introduce it practically to this Company. H. J. MILLER, President.

☞L. BRUCKMANN, 67 Wall street,
Agent for New York.

Worthington's Steam Pump,

Extensively used by

GAS-LIGHT COMPANIES,

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JOINT STOCK COMPANY.

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PLASTIC SLATE
FOR
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The process of reconstructing Slate Stone from a disintegrated state was

PATENTED FEBRUARY 21st, 1865.

It is a combination of

Pulverize late & Vi scous Matter,

(the latter possessing qualities of geological and chemical affinity for the former,) and is a development of one of the simple but unalterable tendencies of nature.

As a Roofing Material it Stands Unrivalled.

A mastic—it adapts itself to every shape and slope. Non-combustible, impervious, non-expansive, and undecaying.

Frost does not Crack nor Heat Dissolve it.

The only roofing material ever discovered that will resist the action of the elements as long as the structure it protects. Being susceptible of little, if any wear, from exposure, and

Perfectly Fire-Proof,

It is unequalled as a coating for Railroad and Farm Buildings, Fences, Bridges, bottoms of Vessels, Vaults, etc.

Edw'd Van Orden & Co.,

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Plastic Slate Roofing Materials,

ROOFING TOOLS, &C.

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AND PIPE WORKS.

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WM. SMITH,

Manufacturer of all kinds of GAS and WATER PIPE, BRANCHES, CONNECTIONS, T's, ELBOWS, and ALL CASTINGS USED AT GAS AND WATER WORKS.

I offer special inducements to parties wishing to purchase, my Pipe is Smooth, regular in weights, and cast vertically.

N. B.—Pipe from 3-inch and upwards, cast in 12-ft. lengths.

☞ SEND FOR CIRCULAR AND PRICE LIST. ☜
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Manufacturers of WROUGHT IRON PIPES and Fittings for Steam, Gas and Water, Boiler Flues, Steam Boilers, Coils, Heaters, Evaporators, Pumps, Ventilating Machinery, and Apparatus for Warming Buildings by Steam and Hot Water.

OIL TUBING, CAST IRON DRIVING PIPE, Boring Tools, Oil Pumps, Sand Pumps, Stuffing Boxes, Tongs, Clamps, Swivels, Joints, &c. 131

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(Used also for Oils and Liquors)

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Patent Steam Generator,
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A PERFECT SUCCESS. BY THIS INVENTION the long sought-for object has been accomplished; to wit: A means by which steam can be generated safely, so that there shall be no more danger from explosion than with the hot-air engine, and at the same time retain all the power of the steam engine. This much sought for result has at last been accomplished, and after many severe tests we feel fully warranted in offering this Steam Generator and Engine to the public as a perfectly safe power, and at the same time a cheap power. As a generator of steam for heating buildings, etc, there is not its equal in use. For further information or circular, address

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Non Freezing and Non Evaporating

METER FLUID,

☞ Far cheaper than any other in use. ☜

For Filling Wet Gas-Meters, cheaper, in the long run, than water.

Six years in general use in works using it, to the exclusion of all other fluid, and driving the dry meter out of use, enables us to recommend the patent with perfect confidence.

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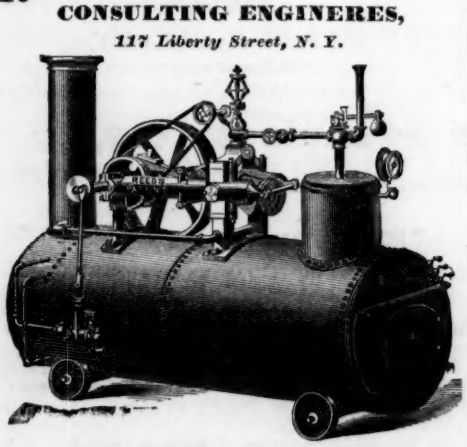

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Of all sizes. Also furnish all kinds of MACHINERY, TOOLS, AND GENERAL SUPPLY. Drawings of all kinds of Machinery executed to order.

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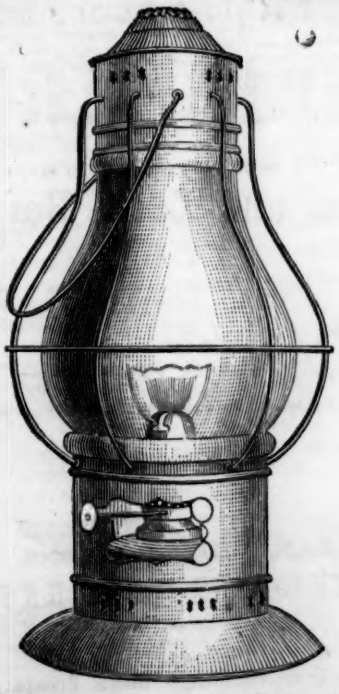

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We are manufacturing at our factory, Middletown, Conn., MANY OTHER STYLES AND SIZES, which can be seen at our Show Rooms, 81 Fulton-st., New York. TRIMMINGS, etc., always on hand.

☞ The Trade are invited to call and examine our Stock.

EDDY'S

Kerosene Cooking & Heating

STOVES AND RANGES.

THESE COOKING STOVES WILL

☞ *Bake, Boil, Stew, Fry and Roast,*

With the greatest economy and facility, and without heating the room in which they are used. They are perfectly simple, operating like an ordinary Kerosene Lamp with a chimney, and are the only Kerosene Stoves that burn without smoke or odor.

"We have been perfectly astonished to see what a labor-saving, dirt saving and heat-saving institution is EDDY'S PATENT KEROSENE STOVE. Taking the cost of running it, and the result attained, it is the best patent in the market."—*Worcester Daily Spy.*

Our Heating and Cooking Stoves are very convenient and economical, especially where a fire is required but a few hours at a time.

Orders for Stoves may be sent through American Advertising Agency, 389 Broadway, New York.

ALEX. M. LESLEY,
Manufacturers, No. 605 Sixth Ave., New York.
Send for Illustrated Circular. (136

KNITTING MACHINES
FOR
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☞ *Something New and Invaluable for Family Use.*

We offer the public the simplest, strongest and best Knitting Machine in the world.

It occupies but little space—is portable and can be attached to a stand or table, weighs about 40 lbs.

It will knit a variety of Stitches—the breakage of needles is trifling—the cost of needles is insignificant and the most delicate material can be knit pure and spotless, as the needles are not oiled.

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Send for a Circular—Agents wanted.

DALTON KNITTING MACHINE CO.,
137] 537 Broadway, N. Y.

WEED'S

HIGHEST PREMIUM

Shuttle Sewing Machine

Has only to be seen and operated to be Appreciated.

Call and see for yourself before purchasing. Please bring samples of various kinds of thread, (such as is usually found at stores,) and various kinds of fabric, which you know the former most popular Sewing Machines either cannot work at all, or, at best very imperfectly.

SUPERIORITY.

over any other Machine in the market will be seen at a glance.

1st It runs easily and rapidly, and is so constructed as to endure all kinds of hard usage.

2d. No breaking of threads in going over seams.

3d. No imperfect action of the feed at uneven places in the work.

4th. The Weed-stitch catches of itself, and will sew from the finest lace to the heaviest leather, and 200 cotton to coarse linen thread.

5th. The Weed Machine will do beautiful quilting on the bare wadding, without using inner lining; thus leaving it soft as if done by hand.

6th. The variety of fancy work that can be done on the

WEED MACHINE,

with so little trouble, makes it equal, if not superior, to six machines combined; for instance. it Binds, Hems, Tucks and Sews on the band at the same time, and in face, the

WEED NO. 2 MACHINE,

as before stated, is equivalent to a combination of any six ordinary machines.

Orders for Machines may be sent through the American Advertising Agency, 389 Broadway, N. Y.

Below we give a few prices:

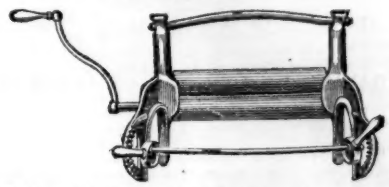
No. 2.	Oil Black Walnut, Ornamented with Hemmer.	$60,00
No. 2.	Oil Black Walnut, Hall Case, Ornamented, with Hemmer.	65,00
No. 3.	Extra Oil-Polished Black Walnut, Half Case, Large Table beautifully Ornamented.	75,00

WEED SEWING MACAINE Co.,
136, 506 Broadway, New York

PUTNAM'S CLOTHES WRINGER.

IT IS THE ONLY RELIABLE

Self-Adjusting Wringer.



No Wood-work to Swell or Split. No Thumbscrews to get out of order. Warranted with or without Cog-wheels.

It took the First Premium at Fifty-seven State and County Fairs in 1863, and nearly double that number in 1864, and is, without an exception, the *best* Wringer ever made. Patented in the United States, England, Canada, and Australia. Agents wanted in every town, and in all parts of the world. Energetic agents can make from $3 to $10 per day.

WHAT EVERYBODY KNOWS, VIZ.:

That Iron well galvanized *will not rust.*
That a *simple* machine is better than a complicated one.
That a Wringer should be *self-adjusting, durable, and efficient.*
That thumb-screws and fastenings cause *delay* and *trouble* to regulate and keep in order.
That wood soaked in water will *swell, shrink,* and *split.*
That wood-bearings for the shaft to run in *will wear out.*
That the Putnam Wringer, with or without cog wheels, will *not tear the clothes.*
That cog-wheel regulators are not essential.
That the Putnam Wringer has *all* the advantages, and *not one* of the disadvantages above named.
That all who have tried it pronounce it the *best* Wringer ever made.
That it will wring a thread or a bed-quilt *without alteration.*

We might fill the paper with testimonials, but insert only a few to convince the skeptical, if such there be; and we say to all, *test* Putnam's Wringer. Test it *thoroughly* with *any* and any others, and if not entirely satisfactory, return it;

PUTNAM MANUFACTURING CO.—*Gentlemen:* I know from practical experience that iron well galvanized with zinc will not oxydize or rust one particle. The Putnam Wringer is as near perfect as possible, and I can cheerfully recommend it to be the best in use. Respectfully yours,

JOHN W. WHEELER, Cleveland, O.

Many years' experience in the galvanizing business enables me to indorse the above statement in *all particulars.*

JOHN C. LEFFERTS, No. 100 Beekman St.

NEW YORK, *January,* 1864.—We have tested Putnam's Clothes Wringer by practical working, and know that it will do. It is cheap; it is simple; it requires no room, whether at work or at rest; a child can operate it; it does its duty thoroughly; it saves time, and it saves wear and tear. We earnestly advise all who have *much* washing to do, with all intelligent persons who have *any,* to buy this Wringer. It will pay for itself in a year at most. HORACE GREELEY.

PRICES—$8, $9, and $10.
Sample Wringers sent, express paid, on receipt of price.
Manufactured and sold, wholesale and retail, by

PUTNAM MANUF'G CO.,
13 PLATT STREET, New York,
BENNINGTON, Vt.,
CLEVELAND O.

C. GEFRORER,

MANUFACTURER OF

Gas Heating Apparatus

OF EVERY DESCRIPTION,

Gas Burners, &c.

No. 529 COMMERCE STREET,

PHILADELPHIA, PA.

Burners for Wood Coal Oil and Water Gas

Gas and Lava Burner Tips

Constantly on Hand. 65

THE AMERICAN METER CO.

Organized under the General Manufacturing Laws of the State of New York

SAMUEL DOWN, PRESIDENT. HENRY CARTWRIGHT, VICE PRESIDENT. RICHARD MERRIFIELD, SECRETARY AND TREASURER

TRUSTEES.

SAMUEL DOWN, WILLIAM HOPPER, R. H. GRATZ, HENRY CARTWRIGHT, RICHARD MERRIFIELD.
THOMAS C. HOPPER, *Superintendent at Philadelphia.*

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS AND REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy and excellence of workmanship. Orders addressed

AMERICAN METER COMPANY,

West Twenty Second Street, New York. Arch and Twenty-Second Streets, Philadelphia. No. 23 West Street, Boston will meet with prompt attention.

Harris & Brother, Practical Gas Meter Manufacturers,

Continue, as heretofore at their old Establishment, No. 1117 CHERRY ST., PHILADELPHIA, to Manufacture

WET AND DRY GAS METERS, and all kinds of GAS APPARATUS, and furnish all articles appertaining to the use of Gas Works. ☞OUR WORK WARRANTED—Satisfaction Guaranteed. Orders respectfully solicted, and promptly attended to, by
HARRIS & BRO., No 1117 Cherry st., Philadelphia.

Messrs. Harris & Brother, Philadelphia Gas Works, February 14, 1857.

Dear Sirs;—I take great pleasure in stating that we have found your meters to register with entire correctness, and to be generally of very good quality—the number furnished by you to these works is over 5,000. JOHN C. CRESSON, Engineer;

Office of the Gas Light Company of Augusta, Ga., March 6th, 1858.

This is to certify that having used meters manufactured by Messrs. Harris & Bro., for the last nine years, we do not hesitate to state they have given entire satisfaction in point of wokmanship and accuracy of registration; they are surpassed by none, and equaled by few manufactories in the Union; we have used meters made by other establishments but our preference is in favor of those made by Harris & Bro., of Philadelphia, Pa.
G. S. HOOKEY, Superintendent of the Gas Light Company of Augusta, Georgia.

Messrs. Harris & Brother, Philadelphia. Philadelphia, March 4, 1858.

Gentlemen—We take great pleasure in bearing our testimony to the very superior character of the meters we have received from your establishment. We have always found the workmanship all we could desire, while the accuracy and reliability of their measurement have always been satisfactory. We have used meters made by other parties, and none have given as entire satisfaction as those received from you. We are, gentlemen, very truly, yours, BIRKINBINE & MEARS.

Messrs. Harris & Brother. March 14, 1857.

Gentlemen—For the last ten years we have used in the Philadelphia Gas Works, meters made in your factory, and take pleasure in expressing my opinion to their correctness. On several occasions I have taken your meters apart, and found the material used in the manufacture of the same, to be as fine quality as is used in those imported from Europe, or made by any of the manufactur in the United States. Respectfully Yours GEORGE WIEGAND, Inspector of Gas Fittings, Philadelphia

C. GEFRORER,

MANUFACTURER OF GAS BURNERS,

529 Commerce Street, Philadelphia, Pa.

Burners for Wood, Coal Oil, and Water Gas. Brass and Lava Burner Tips Constantly on Hand.

GROVESTEIN & CO.,

PIANO FORTE MANUFACTURERS,

499 BROADWAY, NEW YORK.

THE ATTENTION of the public and the trade is invited to our New Scale, Seven Octave, Rosewood Piano Fortes, which for volume and purity of tone are unrivalled by any that have hitherto offered in this market. They contain all the modern improvements, French Grand Action, Harp Pedal, Iron Frame, Over-strung Bass, etc., and each instrument, being made under the supervision of Mr. J. H. Grovesteen, who has had a practical experience of over thirty years in their manufacture, is fully warranted in every particular.

THE "GROVESTEEN PIANO-FORTE"
RECEIVED THE HIGHEST PREMIUM AT THE
CELEBRATED WORLD'S FAIR.

Where were exhibited instruments from the best makers of London, Paris, Germany, Philadelphia, Baltimore, Boston, and New York; and also at the American Institute for five successive years, the gold and silver medals from both of which can be seen at our warerooms.

By the introduction of improvement we make a still more perfect Piano-Forte, and by manufacturing largely, with a strictly cash system, are enabled to offer these instruments at a price which will preclude all competition.

PRICES!

No. 1,	Seven Octave, round corners, Rosewood, Plain Case,	$275
No. 2,	" " " Heavy Moulding	300
No. 3,	" " " Louis XIV style	325

a fac-simile of the accompanying cut.

TERMS—Net Cash, in current funds Descriptive circular sent free on application.

MORRIS, TASKER & CO.,

PASCAL IRON WORKS

[ESTABLISHED 1821,]

PHILADELPHIA,

Manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues, GALVANIZED WROUGHT IRON TUBES,

ARTESIAN WELL PIPES,

of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.

Gas and Steam Fitters' Tools, &c.

STEPHEN MORRIS,
THOMAS S. TASKER,
CHAS. WHEELER,
STEPHEN M. P. TASKER.

J. VAUGHAN MERRICK, W. H. MERRICK,
JOHN E. COPE.

SOUTHWARK FOUNDRY,

FIFTH & WASHINGTON STREETS,

PHILADELPHIA.

MERRICK & SONS, Engineers,

MANUFACTURERS OF EVERY DESCRIPTION OF GAS MACHINERY.

Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gas holders, either Telescopic or Single, with Suspension Frames complete; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam of Hand Air Pumps for providing Street Mains, Centre Seals, Governors, Wrought or Cast-Iron, Line Sieves for Purifiers, Purifier Hoisting Machines, &c., &c.

Address— MERRICK & SONS,
5th and Washington Sts, Philadelphia.

S. FULTON & CO.,

(Successors to Colwell & Co.)

Manufacturers of

PIG IRON & CAST IRON GAS & WATER PIPES.

Also, Heavy & Light Castings of every description, No. 207 North Water street and 206 North Wharves, Philadelphia.

SAMUEL FULTON, THEO. TREWENDT

TO GAS COMPANIS.

THE UNDERSIGNED DESIRES TO undertake the supervision of several small Gas-works, to visit and examine them as often as may be necessary; to obtain and inspect their coal, castings, fire-brick, and other materials; and to manage their general business in such a manner that they shall be under such supervision as is now attainable in large works, at much increased cost. Also, to advise as general Consulting Engineer and expert in practical chemistry.

CHAS. M. CRESSON,
Late Asst. Engineer of the Philadelphia Gas-works
417 Walnut st., Philadelphia.

POOLE & HUNT,
BALTIMORE, MD.,
are prepared to execute orders for
GAS-HOLDERS,
IRON-ROOF FRAMING,
And other descriptions of
Iron Work for Gas-Works, Water-Pipes, and Heavy Castings, and Machinery generally.

GEO. H. KITCHEN & CO.,

NEW PATENT

GAS APPARATUS

For Country Residences, Public Buildings, &c.,

FROM $300 UPWARDS.

EVERY DESCRIPTION OF GAS FIXTURES.

Gas Fitting in all its branches

561 Broadway,
NEW YORK.

THE WOODWARD
Steam Pump Manufacturing Company,

MNUFACTURERS OF THE WOODWARD PATENT IMPROVED

SAFETY STEAM PUMP,

—Adapted for Mining and Fire Purposes—and

Steam, Water & Gas Fittings of All Kinds.

Also, Wholesale and Retail Dealers in WROUGHT IRON PIPE, BOILER TUBES, etc.,

Woodward Building, 76 and 78 Centre Street,

corner of Worth street,
Formerly 77 Beekman Street, *New York.*
53 GEO. M. WOODWARD, Pres't. 64

JOSEPH LENNIG,

1615, 1617, and 1619 Francis St.,

Above Ridge Avenue, Philadelphia, Pa.,

MANUFACTURER OF

Wet and Dry Gas Meters,

STATION, SHOW, & EXPERIMENTAL METERS,

Photometers, Pressure Registers, Indicators, and Gauges, Governors, Meter Provers, Centre Seals, Fluid Gauges, &c.

GAS APPARATUS

Of the most reliable and approved construction manufactured and on hand at the

UNION GAS METER WORKS.

D. PARRISH, Jr.,

GAS ENGINEER

And Contractor for Coal or Oil Gas-Works.

Estimates given for Gas-Works, Gas-Holders, or any Gas Apparatus.

205 1-2 Walnut st., Philadelphia, Pa.

Box 1956, Post Office.

To Manufacturers of Petroleum Gas.

For sale, Parrish's Patent Gas and Air Mixer, adapted to all works using Petroleum or other oils, by which rich Petroleum Gas is mixed, after it leaves the holder, with a proper proportion of air, giving it the greatest illuminating power, without smoke, through any burners. The apparatus being attached to the outlet pipe, requires no alteration of the works.

Apply at the Gas-Works of St. Nicholas Hotel, No. 63 Mercer st., N. Y., where one can be seen in operation; or address D. Parrish, Jr., St. Nicholas Hotel, New York city, or No. 1416 Arch street, Philadelphia.

SAVING OF FUEL TO PARTIES USING STEAM.
DAMPER REGULATORS.

Guaranteed to effect a great saving in fuel and give the most perfect regularity of power. For sale by the subscribers, who have established their exclusive right to manufacture damper regulators, using diaphragms or flexible vessels of any kind. CLARK'S PATENT STEAM AND FIRE REGULATOR COMPANY, No. 117 Broadway, New York.

THE AUBIN BALLANCED

VALVE WATER METER,

(Used also for Oils and Liquors)

Is now in use by many City Water Cos, because of its low price, simplicity, durability, accuracy under any pressure, and (a great advantage) because it runs with less head than any meter used. Manufactured by H. Q. HAWLEY, Albany, N. Y.

WEST'S IMPROVED PUMPS, the most Simple, Durable, and Powerful, and the Cheapest in use.

J. D. WEST & CO.,
No. 40 Cortland street,

R. D. WOOD & CO.,

MANUFACTURERS OF

CAST-IRON PIPE, RETORTS, &c

Office, 400 Chestnut Street,

PHILADELPHIA.

Great Improvement

IN

Sewing Machines.

EMPIRE

SHUTTLE MACHINE!

Patented February 14th, 1860.

Salsroom, 536 Broadway.

This Machine is constructed on entirely new principles of mechanism, possessing many rare and valuable improvements, having been examined by the most profound experts, and pronounced to be SIMPLICITY and PERFECTION COMBINED.

It has a straight needle, perpendicular action, makes the LOCK or SHUTTLE STITCH, which will NEITHER RIP nor RAVEL, and is alike on both sides; performs perfect sewing on every description of material, from Leather to the finest Nansook Muslin, with cotton, linen, or silk thread, from the coarsest to the finest numbers.

Having neither CAM nor COG WHEEL, and the least possible friction, it runs as smooth as glass, and is

Emphatically a Noiseless Machine!

PRICE OF MACHINES,

COMPLETE:

No. 1, Family Machine, with Hemmer, Feller, Gauge, Braider, & Corder, complete. - - - $60
No. 2 Small Manufacturing, with Extension Table, $75
No. 3. Large Manufacturing, with Extension Table, $85
No 3. Large Manufacturing, for Leather, with Rolling Foot and Oil Cup, 100

One-half hour's instructions is sufficient to enable any person to work this Machine to their entire satisfaction.

Agents Wanted in all Towns in the United States, where Agents are not already established. Also, for Cuba, Mexico, Central and South America, to whom a liberal discount will be given Terms, invariably CASH on delivery.

T. J. McARTHUR & CO.,
536 Broadway.

GAS-BURNERS.

WIGHTMAN BROS.,

IMPORTERS AND

SOLE AGENTS

For the United States and Canada, of

SCHWARZ'S

GERMAN LAVA GAS-TIPS

And proprietors of Winchester's Improved

LAVA TIP GAS BURNERS,

No. 25 Kilby Street,

BOSTON, MASS.

T. G. ARNOLD,

MANUFACTURER OF

GAS-BURNERS

And Importer of SCOTCH TIPS,

224 and 226 West 21st street,

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Mercury Cups, Portable Sockets, Burner Pillars, Burner Pliers, &c., &c.

C. GEFRORER,

Manufacturer of

GAS-BURNERS,

For Lighting and Heating Purposes.

GAS HEATING AND COOKING APPARATUS; FITTERS' ROVING APPARATUS, &c.

529 Commerce st., bet. Market & Arch, Philadelphia

JOSEPH LEES,

Sole Agent for the sale of

Thompson's Gas Controller

In the States of

CALIFORNIA AND OREGON,

San Francisco, Cal.

Carrington & Co.'s

GENERAL

PURCHASING

AGENCY,

In Connection with all the Expresses

No. 30 Broadway,

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Established 1854.

Purchases to order any article wanted from New York, or Europe, for ladies' or gentlemen's use or wear,---comfort or luxury,---from a cameo to a cashmer, a seal ring to a steam engine.

Goods purchased at current City prices, and forwarded by Express or as directed.

Commission, Five Per Cent.

Remittances, with orders, can be made by Express if preferred, as all Express Agents will take orders, receipt for and forward funds, and see to return of Goods.

THE HAVANA

MEXICAN & BRAZILIAN

EXPRESS.

CARRINGTON & CO.

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Express for HAVANA and ISLAND OF CUBA by regular steamships weekly.

Express for MEXICO and VERA CRUZ on the 10th and 16th of every month.

Express for ST. THOMAS, BAHIA, and RIO DE JANEIRO each month.

Packages received for United States Brazil Squadron.

Freights should be sent to our office day before sailing of steamer, with invoice, contents and value.

FINKLE & LYON'S

New Family

SEWING MACHINE

Should be known in

IN EVERY TOWN.

To accomplish this at once and save the expense of a *Travelling Agent*, we offer thus, viz:

Any one sending us orders for two machines shall receive one machine free of charge. This proposition cannot avail after we have appointed a local agent in the town.

We have now completed our *new manufacture* at a cost of some $200,000—introducing *new patents*, and such important improvements, that without fear we are able to offer the following stringent guarantee, viz: After a fair trial, if any purchaser does not prefer the FINKLE & LYON FAMILY SEWING MACHINE to any other, he can return it and have back his money.

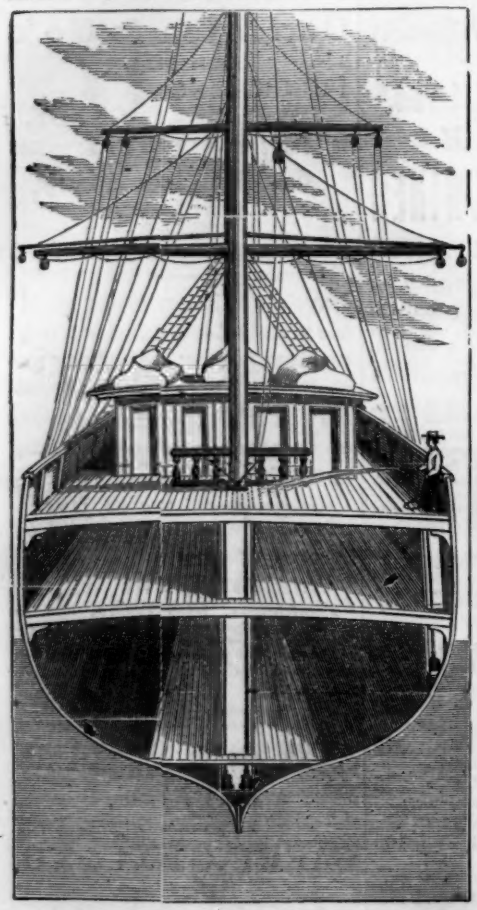
This machine has taken many of the HIGHEST PRIZES; *is less complicated than any other first class machine; does a wider range of work without changing; requires no taking apart to clean or oil, no "lessons" to set needle, regulate tension or operate machine.*

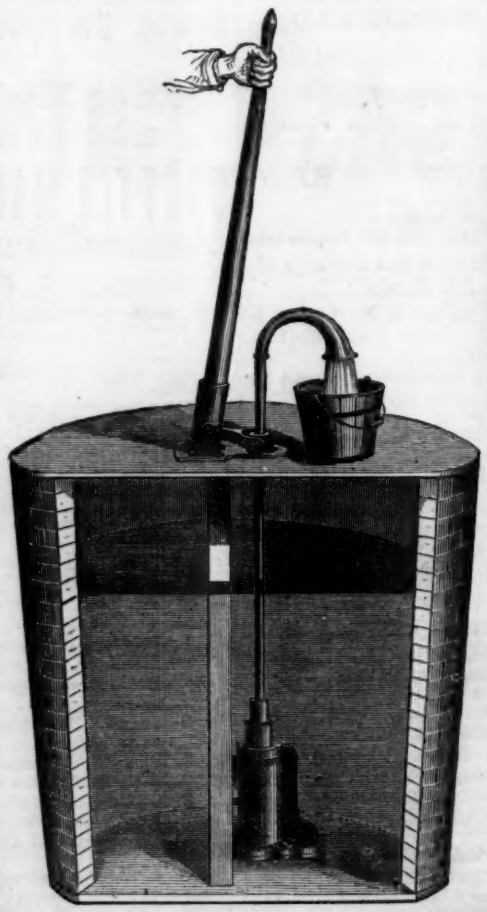
Our new Manufacturing Machine is sold on the same terms as the Family Machine.

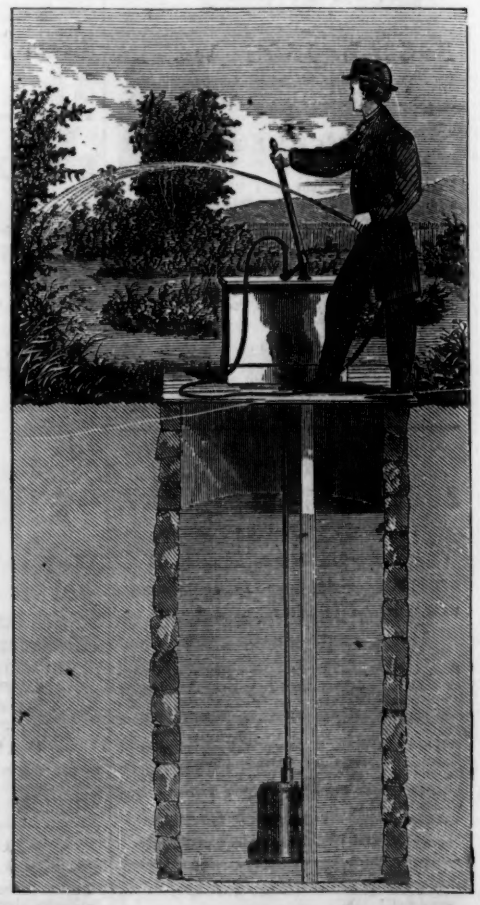
Please send for a circular with samples of sewing.

Finkle & Lyon S. M. Co.

No. 581 BROADWAY, NEW YORK.







AMERICAN PUMP MANUFACTURING COMPANY,

DEPOT NO. 40 DEY STREET, NEW YORK.

A. B. VAN OLINDA, Secretary. C. V. B. OSTRANDER, Treasurer. E. BEADLESTON, President.

STATE AND COUNTY RIGHTS FOR SALE.

Pumps, completed, will be delivered from the manufactory of the Company, to parties purchasing rights at a royalty of One Dollar each.

THE PATENT SUBMERGED PUMP.

This valuable Invention, now first introduced, will, it is believed, supersede all classes for any purpose in use at the present time.

ITS ADVANTAGES.

FIRST.—SIMPLICITY. The entire pump is composed of but six parts, all of cast-iron, which can be put together by any mechanic.

SECOND.—DURABILITY. From the fact that it is always submerged, it is perfectly lubricated, and requires no packing. As no water can remain in the pipe when not in motion, there is no danger of freezing.

THIRD.—CAPACITY. It is contended that, for the power applied, this Pump excels all others. The No. 1 (the smallest size,) of this Pump, with the power of suo hand, has a capacity of thirty gallons per minute, and will throw a stream seventy feet in the air.

FOURTH.—CHEAPNESS. For economy, this Pump surpasses all others, its first cost being about one-third less than that of other Pumps of the same capacity, and being much less both in size and weight, there is a great saving in transportation.

ITS USES.

FIRST.—For a House Pump; the smallest size of the patent Submerged Pump is sufficient for all family purposes. Placed in a well or cistern, water may be conveyed to every room in a common sized house.

SECOND.—For a Farm Pump; for all purposes connected with irrigating, watering stock, etc., etc. This Pump can be placed in running streams, ponds, bayous, etc., and water conveyed to any required distance.

THIRD.—For a Ship Pump; Any ship owner or captain, with short experience in the use of this Pump, will give his unqualified approval for ship purposes, either to be used as a bilge pump simply, or for washing decks, etc. From its simplicity, as a bilge Pump it will be found entirely free from choking, and will clear grain, dirt, stones, etc., with ease.

FOURTH.—For a Factory Pump, or for air in Oil Wells, for Breweries or for pumping acids, hot liquors, etc., it is invaluable. It cannot be affected by any liquid.

FIFTH.—To all Directors and Officers connected with mining interests, the PATENT SUBMERGED PUMP presents great advantages.

The experience of the last five years have clearly proved at what great expense, both in first cost and freight, it has been necessary to be at to secure the proper means of expelling water from the mines, quarries, etc. With this Pump an immense saving is effected in both instances, as in first cost it is much less than other Pumps of the same capacity and power.

Its principle is that of a Double-acting Force Pump, with a heavy double-acting piston cast in one piece, and a double-acting iron valve within the same, without the use of leather valves or any packing whatever.

DIRECTIONS FOR ADJUSTING PUMPS.

1st. Find the exact measurement of the well or cistern from the extreme bottom to the top or curb, after which make such an allowance as may be required, above the curb or top, as will accommodate the sized vessel required to be used, and in respect to the quantity of pipe required, always deducting for the length of the Pump and the space between the bottom and the Pump. 2d. Provide a plank, to which the Pump must be secured, not less than seven inches wide by two or two and a half inches thick, which should reach from the bottom to the top of the well or cistern, always placing the plank on the side of the well or cistern. 3d. Before putting the plank into a well or cistern, fit and bolt the Pump to the plank, and screw the pipe firmly in, taking care to have the Pump not less than one foot from the bottom of a well, nor less than six inches from the bottom of a cistern. Yet, if the water be six feet deep in a well, then adjust the Pump three feet from the bottom, and in like proportion as the case will permit, always being governed by the depth of water in the well, and always observing the necessity of securing the plank at the bottom of the curb, by braces across the well, and standing perfectly plumb and solid under the platform orcovering of the well, when the fulcrum can be astened to the platform, taking care to give the pipe free action when in motion.